RAILROAD GAZETTE

SATURDAY, NOVEMBER 4, 1871.

## Contributions.

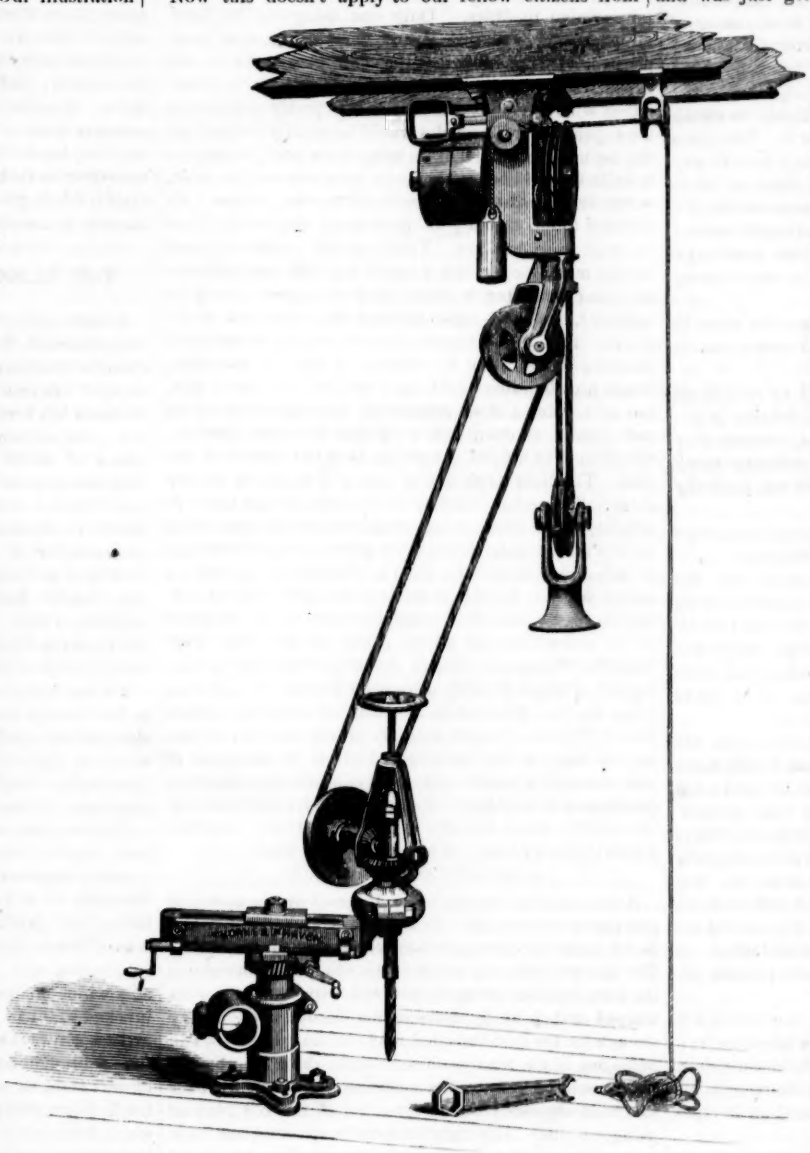
### PORTABLE DRILLING MACHINE.

A great need has always been felt in machine shops and locomotive repair shops, for a portable power drilling machine to take the place of the tedious, inaccurate and expensive hand-drilling with the ratchet. In all machine construction, much time and labor have been wasted in drilling holes by hand, for the want of a practicable machine to do the work. Our illustration represents a tool, manufactured by Messrs. Thorne & DeHaven, Philadelphia, which fulfills every condition requisite for a portable power drill, combining the convenience of a radial drilling machine with that of a hand-drilling machine. It can be bolted to the work to be drilled with more facility then a ratchet brace can be rigged up for hand-drilling, and can be driven by power in any position, in any direction and at any distance from its counter hanger.

The operation is as follows: The power is transmitted to the fast and loose pulleys on the counter-shaft by means of a flat belt from the line shaft, in the usual way. On the other end of this counter-shaft is a grooved pulley which gives motion to the round belt which drives the drilling machine. The pulling side of this round belt passes under an idler pulley held in a frame which rotates on a hollow stud, through which the belt passes. The rotation of this frame permits the belt to be led in any direction to the drill. A weighted idler is hung on the slack side of the belt, maintaining the tension and permitting the distance of the drilling machine to be raised at will. When the rise and fall of this weighted idler does not give sufficient distance, additional lengths of belt can be inserted by means of the hook couplings used.

The portable drill itself is a complete radial drilling machine. The height of its post can be altered to suit different lengths of drills and chucks used in the spindle. The radial arm is traveled by a screw and rotated on the post by a worm and tangent wheel, giving great accuracy of adjustment and permitting this adjustment without the necessity of removing the belt. The frame carrying the spindle, gears and cone can be rotated so as to bring the cone in line with the belt, in whatever position the machine may be. By removing a collar on the bottom of this frame, the spindle can beset to an angle with the base of the machine in any direction. By holding the post in the clamp bearing on the side of the base, the machine will drill parallel to the base.

The usefulness and convenience of this machine will be apparent to everyone, and we would recommend an investigation of its merits to all who have been compelled to see time and labor wasted in their work shops by the frequent use of the ratchet. Any further information can be had by addressing Messrs. Thorne & DeHaven, Twenty-third and Cherry streets, Philadelphia.



*PORTABLE DRILLING MACHINE.*

### VENTILATION OF RAILROAD CARS.

To the Editor of the Railroad Gazette:

Can't you have the sleeping cars better ventilated?

The great Pullman, the prince of sleeping-car builders, lives there in your city, and with your great influence and authority on such matters I should think you might have the whole thing fixed up at once.

There would be no trouble about it; of course nobody thinks there's any trouble about having any place heated and ventilated, to suit every one, until he has tried it two or three times.

But there is just one radical change they will have to make on sleeping cars before they will be fit for an ordinary cold-blooded Northerner to sleep in, and that is they must not be left in charge of hot-blooded Southern citizens and gentlemen of color.

Now I will tell you why: Since the discovery of the telegraph and steam, and the Pacific Railroad, etc., etc., we have got into such a habit of *rushing* all day and keeping our whole system up to such an intense fever heat that we must have the cool, fresh air at night to get cooled off with, or we cannot get to sleep. There has been an entire change within ten years about sleeping with the windows open. Everybody in the country, excepting dear old staid Philadelphia, whose citizens never allow their quiet equanimity to be disturbed, all sleep with their windows wide open, even in the coldest weather, and they just pile on the blankets so as to keep warm, allowing their faces to be uncovered to inhale the pure, cold, invigorating air. This they find gives them a glorious, sound, refreshing sleep.

Now this doesn't apply to our fellow citizens from Africa's sunny clime. Unless they can have a temperature of from 90 degrees to 110 degrees, they are shivering around half torpid. This is perfectly natural to them, you see; in their native climate, if the thermometer got down to 30 degrees or 40 degrees, I expect they would also go into winter quarters or hibernate like bears and other wild animals. Let me give you an illustration, by describing my trip from Chicago. Well, I suppose I might as well begin at the beginning, and tell you all about it. On selecting my berth at Jersey City the conductor told me he could not find me a lower berth, so I found I would have to take a middle berth or none. I asked him if I might have my window up. No, he said, the cars were well ventilated, and they did not allow the windows open. Of course I had to submit. So I stood out on the platform, where I could get some fresh air, till it was very late and I was thoroughly sleepy, and then searched along among the snoring mass for my berth, passed one fellow just having a good time snoring as if he would break a blood vessel, soon found I was too far, had to go back again, and lo! where must my berth be but just over this great Dutchman, with the covers all kicked off, and he making enough noise to shake the very car.

Well, no help for it; was very sleepy and turned in, got a little doze perhaps at first, but kept rolling and tossing until I was almost distracted, and finally concluded I would venture upon the experiment of opening the window. My birth was about three or four inches above the bottom of the window, so the window had to be raised some little distance before I got any benefit. First, I carefully pinned the curtains so the conductor would not find it out, and then very quietly raised the window about six inches, and oh, what a luxurious breeze came streaming in, and how delightful it did feel on my burning and throbbing temples. I laid my weary head upon my pillow and almost instantly fell asleep.

Sneeze! sneeze!! This disturbed me just enough to say in my mind to the poor Dutchman just below me, "Oh, my dear fellow, you are not taking cold, are you? I hope not," and was sound asleep in a minute. Began to roll and toss, by and by; finally got fairly woke up, all in a perspiration, and found the window shut, either intentionally or by accident. Quietly worked it up again, and was just getting asleep. Sneeze! sneeze!! came from the berth below me. "Oh, dear, what is to be done? I am sorry, but can't help it. One or the other of us has got to suffer, and it certainly is not my fault. You ought to have learned to sleep with your window open before this." All at once a bright idea struck me. I took the blanket and pinned one edge to the bottom of the window shelf, so as to prevent the air from falling down upon the man below and throw it all up into my berth, so I got quite a nap before morning.

But what I wanted to tell you about especially was in coming home. The first night, about in the middle of Indiana, I think, some fifteen miles from anywhere, we ran off the track, which detained us about five hours. We missed the connection and had to lie nearly all night at a miserable little water station; could get no sleeping cars, and as my seat was with a strange lady, I had to sit bolt upright all night and could not get a particle of sleep. But next night, being dreadfully sleepy, I was determined to have a good night's rest and stood ready at Columbus to spring upon the sleeping car as soon as it came up, and secure a good berth.

"No lower berths," was the prompt reply to my inquiry.

Dear me, what shall I do? There is not a particle of use in taking one of those upper berths. I can't sleep a wink certainly, and I ventured to try again to see if there had not been some engaged which had not been taken, which might be relet at a little advance in price; but I was assured they were all full, which seemed quite reasonable, from the hot, foul smell that came from the car as the door was opened, and I went slowly away and opened the next car. Oh horrors! what a stench! Crowded with men, women and children half asleep, and all the windows carefully shut. And the next one, and no better. Well, what now is to be done?

I got off and walked to the sleeping car, and made one more appeal to the conductor of the sleeping car. He said he had an upper berth, and assured me it was thoroughly ventilated; said they were very particular to keep the windows in the front and rear open, which gave plenty of draught when the car was moving. But, I said, your man will shut that as soon as we are started. "Oh no, he had instructions to leave it open all the time, and he would see that it was done." Thus assured, I paid my money and turned in, and being excessively tired and sleepy, got in a sort of doze pretty soon. Waked up all in a perspiration, threw off the blankets, got another little doze; finally rolled and tumbled and found myself fairly smothering for want of fresh air. Just then the conductor came along and I begged him to give us a little fresh air. "Oh," said he, "I guess the man has made a mistake and shut the window, and I will have it opened again." This gave us enough fresh air for another little nap. Soon I found myself smothering with the heat again, got up and went to the front of the car. There I found our venerable colored gentleman in the height of his glory, just enjoying himself to his heart's content, with his coat off and in his stocking feet, sitting by a red-hot stove "blacking the gentlemen's boots;" windows all closed, temperature, I should judge, from 90 to 100 degrees.

"Where is the conductor?" I inquired. "Gone to

bed," was his reply. "How soon will he be around again?" "Not till morning."

"Why don't you keep the windows open?"

"Couldn't: lets too much air in."

"But," said I, "he promised me to keep these windows open all night."

"He did not tell me so."

With this I opened one of the windows. Pretty soon the darkey got up and pulled it down, saying we were coming to a tunnel. I waited until I thought we had had plenty of time to get through the tunnel and then opened it again. With this, the old man got angry and said he had charge of the car, and he would not have the window open, and shut it down very decidedly. Not being very belligerently disposed at any time, and especially then, as I had been obliged to dispense with nearly all my clothing, I felt to get into a regular quarrel, in which I would be liable to be pushed off the car in that predicament, might be quite inconvenient, so I kept master of my temper and contented myself with what little air I could get by slightly opening the door a crack now and then.

I think in such cases it is perfectly justifiable to smash out the glass and pull the blind down over it. This gives excellent ventilation, and even if you should have to pay for the glass, it would be much cheaper than to be so poisoned as to be laid up with a spell of sickness for several days. But I doubt whether a railroad could recover damages under such circumstances. I think any intelligent jury would decide the damages to be very heavily on the other side.

I don't believe any railroad company has the right to forcibly shut you up and poison you and sicken you to the great danger of your life.

Now it is the easiest thing in the world to remedy all this, especially in a sleeping car. In the first place, dismiss your citizens of African descent, because they *require* a much higher temperature than ordinary travelers who occupy the sleeping cars, as they are generally active business men.

Give the attendant a good overcoat, and tell him always to occupy the *back end* of the car and *not the front.*

And then the windows might be left open into the front vestibule; but *shut the door from the vestibule into the sleeping department.* This would make the air rise up and pass over the top of the vestibule door, and would tend to keep the top of the car cool, which is the place where they suffer the most with the heat, and it would also prevent any cold draught along the floor.

It might not be objectionable at all to have a good fire in the stove when it was cold: in fact, that would make just the very best kind of heating chamber to build a hot fire in the front of the car and open the front window.

Of all the patent car warmers and ventilators I have ever seen, the very best arrangement is to place the stove in the front of the car (or to have one in each end), then open the window directly in front of it, and pull the blind down. The blind throws the incoming air toward the ceiling and allows it to be well diffused before falling. It also prevents any draughts being felt by the persons sitting directly in front.

It drives the heat of the stove back, so that really it is much warmer in the centre of the car than when the window is closed. It diffuses the heat through the car better. I like it much better than the many contrivances for carrying a small amount of highly heated air in pipes along the sides of the cars.

And now, dear RAILROAD GAZETTE, with my very limited acquaintance and ability, I have already succeeded in convincing a good many conductors of the excellency of this very simple plan, and after using it awhile they become delighted with it; but I know with your very great influence, if you were to set yourselves about it, you could soon make a perfect revolution in the present barbarous system of ventilation and warming of cars.

By doing so you would earn the unbounded gratitude of the many thousands of intelligent travelers, large numbers of whom, I know, read your excellent and valuable journal.

L. W. LEEDS,
Engineer of Ventilation and Heating.
No. 110 Broadway, New York, 10th month, 6th, 1871.

## CHAIRS AND SUB-SILLS—SOMETHING FOR CONSIDERATION.

Something more than a year ago, an article appeared in the RAILROAD GAZETTE recommending the use of cast-iron chairs on every tie as a means of preventing decay—in a great measure—of cross-ties. A recent trip over several roads in various parts of the country, attended with close observation, has strengthened the opinion of the writer that the subject is one of importance, and worthy the attention of the railroad community at large. The object in placing a chair on every tie is to permit the ties to be entirely covered with ballast. When the rail lies on the tie it is obviously impracticable to cover the ties their whole length to a sufficient depth to prevent decay. At stations, however, it is usual to cover the ties entirely, for obvious reasons, and herein lies the proof that ties entirely covered last much longer than those partially exposed. Ties that have been taken up at stations, where they were covered, have been found perfectly sound, while those out on the line, of the same kind of timber and laid at the same time, but only partially covered, were completely rotted. Timber is fast becoming scarce, and ties now cost double, and in some sections more than double, what they did fifteen or twenty years ago, and it would seem that any means, if not too expensive, that will effectually prevent decay or prolong the life of cross-ties should be adopted.

The chemical processes to which ties are subjected on some roads have some things to recommend them, but they are open to objections. Of course it will take time to ascertain the real value of these preparations as to their preservative qualities. Only one thing can be determined at once, and that is, any chemical process is expensive. It is possible that the chair plan would be too expensive to warrant its adoption, but this can be determined with a very small outlay. It is pretty certain that the expense of track repairs would be greatly reduced by the use of the chair. The tie being more firmly imbedded in ballast would be less liable to be disturbed by frost, water, or any disturbing forces of passing trains. Its addition to the stability of permanent way would be of no small consideration. Track would remain in good surface much longer than if the tie was only partially covered, and the saving in labor for track repairs would be sufficient, in a short time, to cover the extra cost of the chairs. This, in addition to the prevention of decay of sleepers, would seem to warrant a trial of the plan. Roads now building could lay a section with the chairs, and by keeping a close account of the expense of laying and repairs, as compared with that of other sections, would soon be able to determine as to the merits of the plan. The chair need not be heavy if made of proper shape. The spikes could be much smaller than those in ordinary use. Another advantage that would arise from the use of the chair would be to prevent the rail cutting or imbedding itself into the tie, which tends greatly to hasten decay. The chair giving a broader bearing surface on the tie, and that being covered, would preserve the tie under the rail where decay usually first commences. These are some of the most important advantages that might possibly arise from the use of chairs on every tie, viz.: Prevention of decay of cross-ties; reduction of expense of track repairs; greater stability of permanent way; a considerable reduction in the wear of iron and rolling stock; and, to a considerable extent, a prevention of accident. There are hundreds of roads in the country which are now in good condition to give this plan a thorough trial. Who will take the lead?

### SOMETHING ABOUT SUB-SILLS.

About eighteen months since, I passed over a new road just put into operation. It was in a wretched condition, as too many of our roads are when opened for traffic. The ties were thrown down in the mud, and portions of the iron were out of sight, covered with mud, the rails warped and bent by tremendous locomotives, heavy enough for the best ballasted roads in the country. The managers of the road promised that in three months the road would be in first-class condition. A recent trip over that road suggested the resurrection of the old plan of using sub-sills. Although the road in question has been ballasted, and of course greatly improved, yet it is far from being what was expected by its managers. Notwithstanding the road runs through a country not unfavorable for the construction of a first-class road, it is extremely doubtful if their hopes of a good road will ever be realized until iron and ties need renewal. This road was not, nor is it now, in any worse condition than thousands of miles of road which have been put in operation in this country. There were some portions of this road (and that is the case with all roads) where it was difficult to get ballast, and the track being laid on clay, in a rainy season, a good track could not be expected. There is no doubt that if this company, and all others similarly situated, had used sub-sills on the worst portions of their road they would have found it greatly to their advantage. The expense of placing a plank, say 2½ inches thick by 10 inches wide, under each rail, would be light compared to what it would save in various ways. Of course it would cost something to get a plank and place it for a sub-sill, but it would not cost as much as a crook d rail. Crooked rails are expensive and unsafe, and by using sub-sills they may be kept straight until the track is ballasted. Several years since (upwards of twenty), a road was built in one of the Middle States 120 miles in length, laid on sub-sills the entire length, with the exception of some portions where it was laid to grade in good material. The first train over the road made as good time as any afterwards. A lightning express was put on the road the next day after the last rail was laid and always made time. It required but few men to keep the track in good condition, and the road has always been first class in every respect. Unlike most new roads, it was opened up to a heavy traffic on the very day of its completion. It was equipped with thirty-ton locomotives, and they were all worked up to their full capacity, and the sub-sills were all that saved the road from ruin. Their iron was in good shape until it was *worn out.* It was not spoiled by being jammed into the mud and bent in the form of a section of wagon tire. The only inconvenience arising from the use of sub-sills, or rather the most serious one, is—or was—the difficulty of keeping track in good line; but this is a small matter compared to its advantages in other respects. Locomotives of the present day do not disturb the line of track so badly as the old type of outsiders, with cylinders set at an angle of 45 degrees, each side gaining about 4 inches on the other at every stroke, "making rail fence," as the boys used to say. There are many places where sub-sills have been used to advantage, and it is somewhat singular that they are not more in use at the present day, especially in timbered portions of the country, and where the iron will be ruined without them. To some managers of new roads it may look like a useless waste of capital to go to any expense to protect the iron, but a little less brass on their locomotives and less silver on their palace cars would enable them to put their track in good condition, and thereby greatly reduce the cost of maintenance.

WM. S. HUNTINGTON.

## THE ILLINOIS AND ST. LOUIS BRIDGE.

As each great engineering task is upon the eve of accomplishment, the problems born with it are solved, new theories demonstrated, and we arrive at an era to which we ever afterwards recur in our onward future progress. So much has been proved in the great universal proposition; and certain natural forces, our knowledge of the effects of which was before vague and uncertain, have been resolved into their proper directions and concentrated upon a point of application. Hereafter they are known for themselves, and become our accomplices in the resolution of other forces which are yet as vague and uncertain as these were erewhile. It is thus that science and practice hand in hand, each leading a little, each following a little, tread surely and safely the path chosen out for them—but not marked save to skilled eyes—towards the great goal of perfection.

Yet the first great law of the principles of construction is but faintly recognized and but too rarely followed. Generations ago it was taught by the Almighty to man upon the plains of Babel, where the tower which was to have reached high Heaven ceased its growth, because there was a confusion of tongues and the workmen could no longer understand one other. But until we learn this fully, that to obtain great ends all engaged must struggle manfully together, we but grope blindly backwards and forwards as a pendulum swings—swinging with much labor, but gaining no permanent height. The men whose fathers saw the Column Vendome rise with cheerful greeting will tear it down; the same engineering skill which molded the brass and stone together will be invoked to throw it degradingly upon a bed of dung; the artist borrows the hammer of the artisan only to deface the far-brought sculptures of ancient Nineveh, while the dumb creatures of art themselves appeal and strive to teach, from every bed of mortar, from every bonded stone, from every pin, or bolt, or rivet, the quiet lesson, that nature is ruled to the will of man by concord and unison alone.

These thoughts connect themselves closely with our subject when we remember that this structure rapidly nears completion, and that it has steadily gone forward from the beginning, and that there are many other great works in the country which are delayed year after year, not because they are unnecessary—for their necessity is admitted—not for want of means—for that is provided—but only on account of some personal or party opposition, itself not important, and having, when personal aggrandizement is left out, no definite object.

This bridge has been generally contemplated for a long time. Borings have been repeatedly made, and the regimen of the Mississippi discussed in all its wild yet systematic vagaries. Every conceivable plan of superstructure has been in turn proposed, and every possible and impossible plan suggested to rest the superstructure upon a substantial foundation. It is probable that the one adopted and now under consideration is the best devised to meet all circumstances.

The general plan was recommended by Captain Eads, the Engineer-in-Chief, in 1866, and has been modified as new experience or better plans for adapting means to ends have presented themselves. Most readers know that St. Louis is situated upon a high bluff rising gradually from the water on the west bank of the river and composed of limestone, with some 20 to 50 feet of clay superimposed; that opposite, upon the eastern shore, the land

is low alluvial bottom, extending for several miles to the foot of the eastern bluffs, which rise into the high prairies of Illinois. The rock, which lies only 15 feet down at the St. Louis levee, falls off slowly as it crosses the river showing the edges of successive strata, until at the levee of East St. Louis it lies some 130 feet from the land level. It appears, however, to be very regular and to have mainly a plain surface suitable for resting the abutments and piers upon. During the time of low water the superincumbent sand—for there seems to be but little other matter—is nearly level. Upon this again flows a depth of water averaging, at the lowest, 8 feet, and about 16 at the piers, while in the highest freshets the surface rises 42 feet higher, flowing over the St. Louis levee, sometimes into the stores, and, where not protected by embankment, covering the Illinois bottom.

The width across at low water is 1,600 feet, this being one of the narrowest points upon the Middle Mississippi, and both sides are so revetted as to prevent any possible abrasion of the banks. It follows, then, naturally, that upon the loose sand of the bottom will the current force be expended, and Capt. Eads, in his report of 1868, refers to several interesting facts to prove that this scour is much beyond what had been generally represented. He further supposes a case—very common in the narrow passage, and which the presence of the bridge would certainly not lessen—of an engorgement of ice. Blocks are piled upon blocks until the suceeeding blocks are drawn by the current underneath the frozen mass and jammed there, forcing the water to seek its outlet still lower, where, soon checked again by new masses drawn in and deposited by itself, it again dives downward even to the bed-rock, where alone the equilibrium of a structure founded in the river could not be disturbed. In accordance with this view, the bridge company decided to place the two piers directly upon the rock, and from causes hereafter to be mentioned the east abutment was afterwards placed in the same security.

Subsequent events in carrying on the work have fully corroborated these views. At 66 feet below lowwatermark pieces of coal as large as cocoa nuts, and evidently mined by man, were taken from the sand by the workmen, and Colonel Roberts, Associate Chief-Engineer, found a bone within a few feet of the bed-rock, at least 83 feet below low-water mark, which, from its condition, could hardly have remained there for any great length of time. Add to this that in April of 1869 the sand did, under the influence of the freshet at its full height—though lower than previous freshets by 10 or 13 feet—scour for full 51 feet below low-water mark, and we may readily conclude that no precautions were unnecessary in securing the safety of each foundation.

It was decided to use the arch as the basis of the superstructure, and steel as the material for the arch, because of its great compressive resistance, and because of its limit of elasticity is so much above that of any other constructive material. This was considered to best insure economy of construction combined with perfect safety; and the Engineer's estimate seems to place this point, when compared with estimates quoted for the same place by able authority, beyond a cavil.

This quality of the material, together with the fact that piers so high above their foundation, and sometimes, perhaps, denuded entirely of their protecting supports of sand, would, for the sake of stability against current and ice, be necessarily very strong, decided the great length of span. This for the two end ribs is 502 feet, and for the center one 520 feet. The arch which was at first to have a rib depth of eight feet from center to center of top and bottom tubes, has since been increased to twelve feet. This the writer thinks a most judicious change. It has appeared to him for years, and from decided experience, that our general formulæ do not give all that advantage to depth which it really possesses. It may occur in some occult law, or it may more probably be in the action of joints in large structures, but certain it is that bridges within his knowledge, which have been designed and constructed by most able men, whose calculations were in full for strength and stiffness, have yet shown, with superfluous strength, a flexibility which there was no other reason to look for. The probability is that it came from the opening and closing of joints, by fluctuating tensile and compressive strains, made greater when once started by periodic re-occurring action. Had the rib been deeper, the value of the joints and the stress to open and close them would have remained the same, while the opening and closing would have been resisted with a so much longer arm. This is to some extent confirmed by the fact that the yielding of such structures was not greatest when loaded from end to end, and when the bending moment is necessarily greatest and the whole arch is in compression, but when, by the local disposition of the moving load, portions of the arch were thrown into momentary tension, and joints thereby opened.

The architectural effect, too, has been magnificently brought out by this change. No treatment could have made such a subject as an arch pleasant, if its chief beauty—the graceful and open sweep from springing point to springing point—had been marred by a straight line cutting across below the crest. If there were no other reason for an arch save as an ornament, an hundred thousand dollars might well be spent upon its perfection. Cheaper trusses, had there been cheaper, might well have been pushed aside. Safety and utility were alone of paramount importance, and it would have been cruel had either required that ugly line which disfigures the first design. The deepening of the truss and a slight change of grade have most fortunately annihilated it, and the latter change has also coincided with a slight dropping of the skew-backs at each abutment about 18 inches below those on the piers, which will also add to the grace and beauty.

This arch will be constructed of steel bars, or staves, as they may well be called, bound together into a tube and shielded from weather by an envelope. Each section, and consequently each stave, will have a length of 9 feet, the ends being turned off truly and so held together as to reduce tensile strain, in the effective opening of joints, to the minimum. Each tube so made will have an outside diameter of 18 inches and a varying inside diameter. Their distances apart, measuring from center to center, will be 12 feet, and stiffness will be maintained and stresses distributed by means of "upset links" arranged triangularly from the upper tube to the lower on pin joints.

These ribs are four in number.

At the springing heavy skew-backs will receive the ends of the arches in sockets, themselves bearing against hard granite blocks set well into the masonry, and the whole anchored into the body of the abutment by huge cast-steel anchor-bolts. Upon the top of this arch, which in itself forms the whole sustaining structure, rests posts, of the open trellis pattern, which, rising vertically to the horizontal extrados, at an intermediate line support the platform for the railroads, and at their summit the roadway for general traffic. This is the plan for each of the three great arches, two of which are 502 feet each in span, and the center one over the main channel 520 feet.

The approaches at each end will consist of five stone arches connecting with the backs of the abutments, succeeded on the east side by trestles for a distance of 1,500 feet, and on the western side by peculiar structures to be hereafter described, where passing through the blocks, and by iron bridges when crossing the streets. At the terminus of this western end the roads will enter a tunnel *en route* to a great central union depot.

Having now given a description of the general plan and design, we will examine the present state of construction and afterward the determined plans for future works.

Commencing at that point in St. Louis where Third street merges into Broadway and is crossed by Washington avenue, we first perceive that the houses next to the house on the northeast corner of the avenue have been torn down for a front width of about fifty feet. Looking down into the chasm which has been excavated about 25 feet deep, we perceive two well-built stone walls about 40 feet apart, running down toward the river, but stopped at the first alley. The place we stand upon is the portal of the tunnel, and these two walls are its approaches. Under our feet the railroads will find their way to the depot through the tunnel, and at the level on which we stand the general traffic will come from the bridge into Broadway and return again. This latter will be supported upon girders resting partly upon the walls and partly upon two rows of columns, not yet commenced, which will follow the center line six feet on each side of it. Gazing beyond, before we leave the place, a network of timbers belonging to the various hoisting apparatus vail the perspective. Proceeding to the next alley, where our first parallel walls stopped, we find a cross wall, the top of which is nearly on the level of the alley and at masonry grade, for the bridge approach. Beyond this, and continuous with our first walls in direction, are two other similarly-built walls which rise only to our cross wall for the railroads, but offset upon them will be lighter walls to support the wagon road. These are also 40 feet, nearly, apart, and between them and between all the straight-wall structures two rows of columns will be built, so that three rows of girders transverse to the center line, and each 12 feet long, to give a full inside width of 36 feet, will support the railroad, and above them similar rows of girders on lighter offset columns and walls will support the street way.

We have now arrived at Second street, where a neat front will terminate the last-described walls and allow of a one-story storage warehouse beneath the railroad tracks. Crossing this street, about 18 feet above the footways, will be placed an iron bridge, double like all the rest of the work—a through-bridge for the railroad, a deck-bridge for the wagon road.

From Second street down to the next alley and thence to First (or Main) street, the same law of construction will be continued: two stone walls rising up nearly to the railroad, surmounted by lighter walls to wagon grade; two rows of stone columns rising up to railroad grade, surmounted by lighter columns to wagon grade; wooden girders 12 feet long from wall to column, column to column, and column to wall for each platform; and a storage warehouse underneath, with neat stone fronts on streets and alleys. At present the walls are being rapidly completed and the foundations of columns laid in. Of course the wood and iron work is not yet commenced. Main street will also be crossed by an iron bridge about 20 feet above the sidewalk.

Thence—that is from Main street nearly to the levee—the construction changes. On the east side of Main street, in the exact position in which there once stood a store, a neat cut-stone front has risen, very plain, but tasteful, with a smooth wall, slightly offset at each side, and a simple cornice. In the center is an arched doorway, giving entrance to the interior. From this front as a first buttress, seven arches, averaging about 30 feet span each, with their axis, of course, transverse to the axis of the bridge, step from pier wall to pier wall towards the river. Of these the center one is open at the ends to give clearance for an alley. The ends of the others are closed with stone, and they will form vaults to which entrance will be given from Main street from both sides of the intermediate alley, and from the Levee street by arched entrances through neat stone fronts, and communication secured by arched doorways cutting through the pier walls along the axis of the bridge. The walls of these vaults are of lime stone, except the front walls, as are also the arches where exposed. The covered arches are turned in brick. The fronts and ornamental arches will be in sand-stone of a buff color. The covers of the vaults will form the railroad grade.

Upon the Levee street stands the first portion of the approach proper. Its front is on the house line, and its rear forms the end of the before-described vaults. Its center portion is a hollow rectangle, and two other smaller rectangles form wings to this, as we see by the foundation, which is only some two feet high and built so far of red granite. Above this it will be finished off with buff sandstone.

Crossing now the Levee street we enter into the principal work-yard of the bridge company, where within a board fence they have their minor offices, their machine shop, their storage warehouses; where great piles of cut and uncut stone—the first naked and the second protected at the edges by plank frames—a forest of derricks, hydraulic rams, steam pumps, mule railroads and miniature turn tables, and trucks to carry stone meet the eye at once, while a second after stone boats just arrived from Grafton attract attention lying outside in the river. Within this yard four piers are going up. They all have bases of red granite, from which rise shafts of buff sandstone, knotted and draughted. Their distance apart is 26 feet, their length about 45 feet, and their height to springing line 29 feet, from which line they are being connected by arches of the same kind of stone and with the same technical garniture. This brings us across the levee and to the western abutment.

The back of this structure forms half the support of the last small arch mentioned, and thus makes the arcade a continuance to itself. It was the first part built and was placed upon the solid rock about 20 feet below low-water level by means of the old-fashioned cofferdam, consisting of the usual arrangement of guide-piles, sheet-piles, walling-pieces and clay puddle. On account of an accumulation of old wrecks and the lost debris of a former period, the securing of this foundation was decidedly the most troublesome part of the whole work, and was therefore happily rid of in the beginning. To the level of the street it has been built of huge blocks of Grafton stone (lime), and its interior is filled with the same, but its architectural proportions will be decked with a thick covering of gray granite in front and on the tail of the buff sand-stone. The form can be best seen from the engraving in the number of the RAILROAD GAZETTE of July 1, 1871. Its tail is now built nearly to the masonry grade of the railway, and to receive the ring stones from the nearest approach arch which connects with it. From this point the masonry is stepped down quarry fashion, until we reach the springing level, where is a broad level space containing four wells connected by as many drift holes to the front. Along the front the granite has been raised a course higher, and through this front, pigeon-holes have been drifted to coincide with the other drifts. Through these the steel anchor-boats which secure the huge skew-backs to the masonry will pass, and be anchored firmly in the wells, which will then be filled up. This is the next work on hand.

In the stream is the west pier. This rises from its rock foundation about 100 feet of heavy limestone masonry. At this height it is slightly offset, and upon this is

placed the gray granite dimension stone necessary for the reception of the skew-backs. This part of this pier is similarly circumstanced to the same portion of the west abutment. Above this and the east pier are still remaining the piles driven as ice and water breakers. These commence about 200 feet up stream with a single pile. From this the outside row of piles spreads out in V form to the piers. These were then protected by other piles within the arms and by slant timbers with a downward inclination outwards, clothed with heavy plank, and thus a sufficient protection was formed against all dangers from above. Within the western one there now lies the boat carrying the hoisting engines and below this pier is another. Upon each pier is a square timber frame for hoisting, arranged as follows: At each side and resting upon piles, three square posts rise to the height of grade, are there capped and intermediately braced, and so form a supporting frame for the derricks. This is the general plan for nearly all the derrick frames upon the work. Viewing these things, our boat arrives at the eastern pier, a description of the construction of which will make sub-fluviatile work more familiar to us.

This pier is now completed to a point 135 feet above foundation, where the rock work ends; and we now see upon that, set inward upon a beveled shoulder, the first course of gray granite dimension stone. Upon the top course nothing remains to tell us of the work which was done below, as this pier was, like its western fellow, built first from the water upward; and then, as it were, downward to the solid bed-rock. It is closed up and solid now, and the spot where men walked and worked upon the rock full 70 feet below the bottom of the river, is shut out from mortal eye forever.

The manner of construction was thus: After the points were marked out accurately, two boats were brought transversely across the axis of the bridge and a certain distance apart. Here they were firmly moored. Upon each of these boats were derricks, worked as described and illustrated in this paper, July 1, 1871, in the report of the Chief Engineer, which paper also describes the sinking of the guide piles, the floating of the caisson, and the general *modus operandi* of the work. A few days after the caisson is arranged for duty, a boat takes you over from the St. Louis levee. Crossing a tow-boat which has just arrived from Grafton with a load of huge limestone blocks, and which the triangular points of the derricks described in the report overhang, you step upon one of the little construction boats (upon which is all the steam power used for air and sand pumps and derricks). Across this you see, through the derrick masts, a wall of boiler plate iron, put together in scales of about 2 by 5 feet, and about 10 feet high. Climbing to the top of this by a ladder, you may look into the caisson.

You first see that iron girders cross it parallel with the center line of the bridge, the tops of which are about 10 feet below you, and that masons are busily engaged in filling between these with stone. Then you notice that the caisson is within the compass of eight piles, which are capped by huge timbers from which depend the screws, which, at their lower ends, are shackled into some of the girders. Around the sides boiler-makers are adding plate after plate to the skin of the caisson, who will continue to do so as the pile descends. You know, because you have read the description, that below the girders and the floor upon which the stone is laid is another chamber, described in the report; that this is full of water now, but will be filled with compressed air in a few days; and you see before you the tops of the air-locks and the ends of pipes which connect with the pumps, air-locks and the tubes underneath.

Again, you have returned to St. Louis after several months of absence, and have a great desire to see for yourself how the bridge has progressed. Receiving a pass at the office, you are again set upon what would appear to be the same tow-boat, with the same stone upon it, as you crossed before. But it is not. That stone is now sinking through the bottom sand of the Mississippi. Crossing it more carefully, for all three derricks are in lively operation now, to what is not the same, but only a continuance of the same iron wall, you climb to the top of that, and walk over a short plank to the top of the masonry, which at this moment is a little lower than the skin. It is now a solid pier, apparently, only here and there marked by the iron connection of the air-lock, and so forth. You now notice that the masonry has been drawn in on all sides, and that it has receded from the skin, leaving a space into which refuse stone and sand are thrown to counterbalance the pressure from the outside; that the engines upon the boats at each side are in full work; that the masonry is remarkably good and solid; that the screws have been removed, and that the huge mass is only guided now by the resistance of the sand through which it sinks. About this time you have arrived at the head of the "grand entrance."

This is a brick shaft dropping vertically to the iron girders which you saw in your former visit, and thence is finished in iron through the air chamber. The steps, which descend spirally, are evidently easy and comfortable to walk upon, and you naturally try them. Now for 20 feet you are walking through the water; then for 40 feet you are without effort breaking through the sand; and now you stand even below the scene of your former visit. But you are now hemmed in by the circular walls of the well; then you had free range of the caisson. On each side of you are iron doors, about 18 inches square and 30 inches from the floor. The place is damper than a parlor, but drier than a well 60 feet below water surface should be. This you notice while a man who is sweeping the floor tells you that one of the doors will be open in a moment. There is a sound as of a whistling of air through pipes, and soon a door does open and a man within beckons you to step through, which you do, into an iron bandbox, say 6 feet in diameter, and about 9 feet high, containing several pipes with air-cocks upon them, and a seat. As your companion has a candle, you observe another similar iron door opposite to the one by which you entered. Your companion now closes the latter and turns one of the cocks, when there comes in with a sharp, loud hiss an atmosphere which is destined to arrive at a normal pressure of about 40 pounds to the square inch. Directly you feel a severe pain in one ear. Your guide asks you concerning it, and directs you to perform the motion of swallowing, which you do, and are relieved. After this you swallow involuntarily. The guide now tells you, speaking in a key above the hissing of the entering air, that the strength of 40 men could not open the door through which you have just passed, and that the opposite one will shortly be loosened. Soon this occurs, and you slip through upon a floor of loose sand, which, illuminated by the candles of the workmen, looks like bright yellow sugar just turned out fresh from the hogshead. You walk through it with great freedom, and even when passing through one of the log girders which divide the chamber into three compartments longitudinal with the pier by an aperture about 18 inches square you step deep into a loose pile of it, you step out with little apparent effort. A little to your right and extending downwards from the ceiling is a pipe with a loose valve hanging to the end of it and palpitating like the tongue of a hot dog. This and others around supply the apartment with air. Upon your left a man is shoveling sand into a trough of water. Into this trough is encased the lower end of an iron pipe which drops from the ceiling. Near the top of this another pipe, which comes through the masonry parallel with it, turns into it and a little upwards. This is the sand pump. All the sand which the man throws into the trough is sucked up by the vacuum created by a stream of water which comes down the second pipe and is projected upwards through the first. And so this goes on regularly for days: the sand excavated, the caisson with its load of stone sinking, and the masonry added continually until the rock is reached. Then men say that "another engineering epoch has occurred. The east and largest pier of the St. Louis Bridge has safely reached the rock through a depth of ninety feet."

Still walking around, you notice that the peculiar bright appearance of the sand comes from the fact that although the air pressure has driven all the free water from its interstices, yet a film surrounds each grain, retained there by an adhesion superior to the pressure, which brightly reflects the yellow light from the candles.

Now talking of candles reminds us of the Chief Engineer's remarks upon the danger of fire in this triply compressed air, and his experiments thereon. These, moreover, have been noticed as not agreeing with the experiments made by Dr. Frankland (Philosophic Transactions, 1861). As this subject must become of importance, in view of the increased use of compressed air in hydraulic construction, it may be well to lightly compare the two series of trials and show that there is no discrepancy but an actual agreement. Captain Eads plainly speaks of the danger of fire, and instances several cases where the clothes of the men had actually caught the flame and suffered from extraordinary combustion, as showing the increased consumption arising from the increased supply of oxygen. Dr. Frankland, in his memoir, on the contrary, shows that from the rarefied air upon the top of Mount Blanc, to the laboratory condensation of three atmospheres, there was no more tallow consumed, and therefore no more combustion in the one case than in the other, and that the quantity agreed precisely with the quantity of material consumed under the normal pressure. The discrepancy, however, is explained by the very reasons deduced from his experiments, which he gives as the decreased mobility of the atoms of oxygen arising from the increased condensation. It is plain enough that, other laws being equal, the mobility of the particles may be in exact inverse ratio to the density, in which case the combustion will remain the same through all changes of pressure.

But would Dr. Frankland's experiments, if instead of being conducted in a bell glass practically air-tight and the pump stopped as soon as the desired pressure was obtained, made with a bell glass leaking at every pore, so that the pump would constantly have to supply the deficiency, with moving figures flitting from place to place, always in motion and constantly breathing, with the test object—the candle—continually changing its position, and sometimes blown upon with a strong blast from the lungs, with the figures violently agitated when the fire touches them—would, we say, his experiments have given the same result? It would seem not; for then the mobility of the oxygen particles would not have been decreased with their density. The action of leakage, the effect of moving bodies, would have restored the mobility, and we should have three times the oxygen with nearly the same, and not one-third, the mobility, and consequently nearly three times the combustion.

There is, therefore, great danger from fire in compressed air, and a strong light which could be retained in one place where the air is still is a desideratum.

But we have now visited the sub-fluviatile chamber and seen its wonders, and so returning through the air lock, where the letting off of pressure does not affect the ear, we are at the foot of the spiral staircase.

Here comes the tug of war. Your strength, which has been increased by the compression, has now fearfully diminished. You are weary, and without nerve for the ascent. You feel, indeed, as a wet rag might feel if suddenly brought to a consciousness of its limpness. So with sloth you drag your weary way to the top, and finding the air there still bleak and wet, and Novemberish, and that when you get upon the streets your umbrella is twisted in every direction by the wind, save the direction from which the rain comes, you wish you were back again, deep under the river, with a plentiful supply of tempered air, strengthened with oxygen, and a steady umbrella over your head capable of turning aside the northwest wind and the full flow of the Mississippi River.

These feelings soon wear off from you, for you have only spent an easy hour below; but to the laborers it is a matter of serious importance, and to the engineer who looks forward to the future use of compressed air, of prime necessity. For to the men it has brought, in some cases, disease, and in a few, death; and the engineer is in duty bound to guard those whose labor he uses with all the resources of his science. Although I cannot pretend to look upon the medical side of the case with a clear sight, yet as every little idea connected with the subject may assist in forming a rich mine of information, we may for a brief space discuss the question from an engineer's stand-point, and in the light which it presents itself to him, as a very extreme case of bodily fatigue. By fatigue is not meant the feeling of weariness, but the actual physical state of the body after extraordinary labor.

We know by the microscope that the muscles under the control of the will are composed of fibers, seeming to be chains of disks set together, face to face, like piles of minute coin; that these are separated from each other and into bundles by membraneous tissues which envelope them, and that they are permeated by nerves and blood-vessels. We know that all these objects undergo metamorphoses; but for simplicity we will confine our discussion to the muscles proper. In 1842 the doctrine was first promulgated by Liebig, "that every production of motion by an animal involves a proportionate disintegration of muscular substance;" and we may join that to the well-known law, that all disintegration of substance is the result of its union with oxygen. We may then derive, generally, that with twice or three times the quantity of oxygen supplied—in accordance with the above laws—twice or three times the disintegration would result. From the experiments of Dr. Frankland we learn that the oxygen, in being increased, should not lose its mobility, or, in other words, that each atom should be as free to move after compression as before.

To produce most of its action upon the body, the oxygen of the atmosphere is taken into the lungs, where, uniting with the carbon of the blood, carbonic acid gas is produced, set free and driven off in the expiration. So far as the air acting in the lungs is concerned, its mobility cannot be much decreased by condensation. For the lungs are constructed like a sponge, and the oxygen in its union with the blood is sifted and kept in motion by squeezing and straining through the tissues under great force. This is the case even with the lungs in their normal condition; but we know as a fact that they act with greater freedom and force under the chamber, and, moreover, we obtain from the candle experiments of Captain Eads—for it is really the same chemical act—that immense quantities of carbon are driven off and wasted besides what is actually united with the oxygen. It is the waste of carbon, which may be called the basic ingredient of the tissues, that is the waste of the muscle. Further, this disintegration is also a chemical degradation

The combinations in their change fall from a highly developed state to a lower one, and this can only occur by the throwing off of large quantities of force which has, until then, acted to hold them up in their chemical grade. We have then at once a more rapid disintegration of matter and a more rapid yielding up of force (heat) by the body.

When a man has been for a long time engaged in extraordinary labor, from the pain of which an active and energetic mind has freed him, and sits down to rest, he feels that, by the violent action of the muscles and by the deep respirations of the lungs, he has thrown off from their former position certain portions of his body, which, owing to the violence of his exertion—in a limited time—have not been so rapidly replaced. He has no contrary means by which to create a violent replacement to correct the violent displacement and keep up an equilibrium. He needs rest. He needs that time free from exertion, in which nature at the normal pace is able to build up again. This cannot for a moment be hurried, because the source of his recuperative power is constant. The oxygen, which only has been increased by his increased respiration, has destructive but no constructive power. He feels the loss of actual material, in weariness, and under very great fatigue the loss of force (or heat) which he has undergone, as cold or chilliness.

The loss, then, which comes from a cause external and practically unlimited has increased as this external power has been drawn upon; but the reproduction which is governed by a constant power only dependent upon his own physical nature has gone on as usual. He has lost three parts of material, let us say three parts of force, and has in the same time only reproduced one of each, and has, therefore, two parts of each wanting to be still replaced.

But there are cases on human records, where men of great will and men under strong excitement have carried this too far—so far that the basis left did not afford sufficient foundation for the necessary reproduction. And this might more easily be the case when the disintegration goes on more quietly than in severe exertion, when the will is less taxed and consequently there is less consciousness and less pain until an extreme point is reached. Under this view we may more readily understand the acute pains in the joints described by Captain Eads; for the loss of three times the amount of "joint oil" as is replaced, should result at last in most severe pain.

But viewing the animal muscle as it has been described, and reflecting that i s great characteristic is its "contractile power" when in life, and the absolute loss of it in death, and that the only actual knowledge which we have of these two states is this: that in healthy life the loss and gain in tissue is equal, and in death only the disintegration goes on; and further, that the contractile force must be a molecular or at least a conductive force, we may infer that it would be much influenced by a want of connection in the muscle, and that a want of connection would result from a wasting of its substance in a ratio measured by the preponderance of the disintegration over the integration. In all human labor—and it was the men who labored who suffered—the muscles are unequally exercised. Even those lying contiguous and parallel or radial with each other are not equally used. It is not difficult to conceive, then, that where one muscle has been constantly losing its contractile power for a time, while another has by relative rest held nearly its own, their actions would be unequal upon the same attachment, a drawing aside occur, and the first symptom of muscular paralysis be developed.

Looking at the matter in this light, we may believe that the engineer was most probably right in considering that time was the element of destruction which could be most easily managed, and that exertion should be husbanded by sending the men in elevators. The men themselves thought that galvanic action assisted them; it is therefore probable it did—either by retarding the losses or by assisting the reproduction. But there may be elements yet unknown which may more signally help, and the beneficial property of these must be one of two—either that they shall assist reproduction or retard loss. It is pretty generally admitted that light acts upon the organic economy in the exact opposite direction from oxygen; that light assists in storing carbon where oxygen consumes it and drives it, as a gas, away. Therefore some influence for good might be obtained from bright chemical ray-giving lights, magnesium, for instance. There are also substances used for food that have the peculiar property of conserving the animal tissues. Tea and coffee both act in this way, and men are said by the use of the latter to be able to stand great fatigue on a very insufficient quantity of food for years.

Besides the effects confined to the action of the lungs, which have been especially discussed, and those upon other organs, which have not, we may also take into account the fact that the whole body is, as it were, saturated with triply oxygenated air. This cannot result in a mere null effect. The chemically attractive distance into which atoms are brought by pressure, and the actual contact which must often ensue between the oxygen and affinitive substances, lead to a belief of effect from this cause, which under the greatest pressures may become important. Again we find that the air has to be let in behind the tympanum, because not able to penetrate it, and there may be other membranes which, under greater pressure, suffer and cause sufferings to other organs as this does to the ear. While within the air chamber, and as long as the body is kept free for the flow of disintegrated matter, it would require a long time for injury to commence. The connection and conduction are so thoroughly kept up by, as it were, a liquid freshet through the tissues in osmose, that injury would come only late; but when this freedom of flow is checked by a reduction of oxygen, when the wasting of substance has arrived at an extreme point, but the lungs refuse to remove the debris, so that there comes a choking up of the canals and the flow of liquids partly ceases, then we may look for non-contractile powers in the muscles, and for disease to show itself.

Leaving this subject in hopes that some "good physician" may correct the errors, use what truth there may be in it and provide appropriate remedies, we cross to the eastern side.

On this side the approaches are similar nearly in design to those upon the west side, namely: the east abutment, five small arches and a terminal abutment with a ground plan of three rectangular cells, the changes in the sinking of all which may be got from the before-mentioned report. They have been finished to the top of their rough work, and are now receiving from four derricks, with their steam engines and through mule railroads, from tow boats, the red granite for their superficial pedestals.

The engineering staff in charge of the construction of this great work consists of James B. Eads, Chief Engineer; Henry Fladd, Assistant Chief Engineer; and Charles Pifer, Principal Assistant Engineer.

LOUIS NICKERSON, Civil Engineer.

## Robbing an Express Car.

The Memphis *Avalanche* reports as follows the seizure and robbery of an express train on the Mobile & Ohio Railroad, on the 21st ult.:

The robbing of express messengers has long been regarded as one of the finer branches of thieving. Usually one or more masked men suddenly appear in the car, and, with cocked pistol leveled at the head of the messenger, rifle his safe and then jump from the train. An instance of this kind, with slight exceptions, occurred on the Mobile & Ohio Railroad last Saturday evening. The train going north at that time stops at Union City for supper. As another train usually passes down at the same time, the passenger train is backed down the road a short distance and run on a switch. Saturday night the train arrived on time, and was duly switched, after which the engineer and firemen repaired to the eating-house for their supper. Since the late robbery of the express car at Moscow, only a few miles from Union City, the expressmen on this road have been doubled, two men remaining with each car. One of the men is the regular messenger, while the other is merely a guard. At Union City that evening, the regular messenger went to his supper and left the guard to watch the car. In this way there was, at the time, really but one man about the train.

After finishing their suppers, the engineer and fireman lighted their cigars and started for the train. To their great surprise they discovered that it was at least a mile down the road. Starting in a rapid run they soon arrived there, and, upon examination, found everything about the engine all right. Knowing that a guard had been left in the express car, they went back to question him in reference to the strange proceeding. The guard was found sitting, almost speechless with terror, in one corner of his car, while his safes were open and the contents strewn over the floor. When asked what was the matter, he finally managed to make a statement to the following effect:

Soon after all had left the train for supper, and while he was eating a cold lunch, he noticed the train start off, backing down from the station. Before he could even arise to ascertain the cause, two men entered the car with drawn pistols and demanded his keys. Thinking more of his life than the property intrusted to his care, and being likewise frightened nearly to death, he hastily complied with the brusque demand. With a cocked pistol, the muzzle of which was a very few inches from his ear, the guard sat very still while one of the men rummaged the safe. After running a short distance, the train gradually slackened, and the guard heard a rough voice coming from the engine, which wanted to know if they were not about through. As they were, the engineer *pro tem.* was so informed, and after kindly telling the guard that they would kill him if he moved, the two men took their departure, carrying with them all the money that had been in the safes. Three men were all the guard thought were connected with the affair. He said he would have given an alarm, but he was afraid that the men would kill him.

The amount taken from the safe was between $1,500 and $2,000, principally in small packages. There seems to be a regular organized band of robbers in that portion of the country, similar to the Reno thieves of Seymour, Indiana, fame. Hunting them down, convicting and hanging them would have a good effect.

## Chicago Railroad News.

**Freight.**

An increase of five cents per hundred has been made on fourth-class freights and bulk meats to points east of Pittsburgh, Buffalo and Toronto, and of ten cents per barrel on flour. The extraordinary low prices on westward bound freights remain, and assist materially those Chicago merchants who have heavy stocks to replace. The deficiency of stores has caused merchants to leave freight at the depots where received to such an extent that they are badly crowded, and special efforts are made to have it removed.

Lake freights are lower, wheat being taken to Buffalo for nine cents per bushel.

**Chicago & Northwestern.**

This company has replaced its north side station near the corner of Kinzie and Wells streets by a large one-story temporary structure about 200 feet long.

The general offices are in a handsome brick dwelling at No. 140 North Union street.

The general freight agent, Mr. C. C. Wheeler, has his office at No. 75 Kinzie street, near the depot.

Since the beginning of this week all passenger trains on the Iowa and Galena Divisions have started from the new Wells street depot, where, also, commutation tickets are sold. Trains on the Milwaukee and Wisconsin Divisions leave from the old Wisconsin depot, which now is quite near the new business center.

**Chicago, Burlington & Quincy.**

The general offices of this company are established at No. 502 Michigan avenue. Passenger trains run to Indiana avenue and Sixteenth street, to the "Weldon shops" of the Illinois Central, near which an empty ice house serves as a temporary depot.

As an example of the generosity of the West, it should be known that within four days after the Chicago fire this company had unloaded in Chicago *one hundred and fifty* car-loads of provisions and supplies which had been forwarded over its road. Nearly all of this came from the smaller towns and cities, this road not connecting directly with any place of more than 25,000 inhabitants.

**Chicago, Danville & Vincennes.**

This road is to be completed to Danville early next week, probably on Monday or Tuesday. Chicago will then have connection with a large territory in Southwestern Indiana with which heretofore it has made scarcely any exchange, and a shorter route to the Indiana block coal-fields about Brazil than heretofore. It is not to be expected that such places as Evansville and Vincennes will at once find their chief markets in Chicago, but some of their business, doubtless, will go to that city, and from Terre Haute northward Chicago should be able to maintain intimate relations.

**Chicago & Alton.**

This company gives notice that 26 of first-mortgage sinking fund bonds, numbered 115, 59, 50, 272, 468, 249, 265, 75, 350, 427, 206, 232, 38, 371, 112, 464, 419, 532, 281, 156, 26, 113, 243, 455, 153 and 587 of $1,000 each, have been designated by lot for redemption. According to the terms of the mortgage, interest thereon will cease November 1, 1871. S. J. Tilden, of No. 12 Wall street, and L. H. Meyer, of No. 21 Nassau street, New York, are ready to pay them, with accrued interest, on presentation and surrender.

This company and the Illinois Central have been carrying excursion parties from St. Louis to Chicago and return, leaving St. Louis Saturday night and returning Monday morning, at half-price. Chicago seems to be more attractive to St. Louisans than ever before, and crowds go to see its ruins, which indeed are now one of the wonders of the world, and well worth going a day's journey, or more, to see.

A Jacksonville, Ill., correspondent of the Missouri *Democrat* says, that the special train which brought fire engines from Bloomington to Chicago during the Chicago fire, made the trip of 126 miles in two hours and ten minutes, and ran from Bloomington to Joliet, 89 miles, in 80 minutes! In two hours and forty minutes from the time the engines left Bloomington they were throwing water on the fire in Chicago.

On Monday, the 30th ult., this company opened its "Louisiana Route" between Chicago and Kansas City. This route we have frequently described heretofore. It consists of the 126 miles of the Chicago & Alton main line between Chicago and Bloomington; 110 miles of the Jacksonville Division, from Bloomington to Roodhouse (21 miles south of Jacksonville); the new Louisiana Branch, from Roodhouse west to Louisiana, Mo., 37 miles; the part of the Louisiana & Missouri River Railroad from Louisiana westward to Mexico, Mo., 51 miles, and the North Missouri Railroad thence to Kansas City, 163¼ miles. This makes a route only 487¼ miles long, which is about the same length as (1¼ miles shorter) the shortest other route. It has been equipped with some of the finest day cars in the world, lighted with gas, and with Blackstone's platforms; Pullman sleeping and dining cars run on the trains, and cars are transferred by ferry at Louisiana, so that passengers do not change between Chicago and Kansas City. The Kansas City trains by the Louisiana route leave this company's depot in Chicago at 9 A. M. and 9 P. M.

**West Wisconsin.**

The office of the Phillips & Colby Contracting Company, which is constructing this road and operating it during construction, is for the present at No. 100 Calumet avenue, the residence of the President. Their losses by the fire were trifling, and the destructive Wisconsin fires have chiefly been south of the company's line, and, by the destruction of lumber and lumber districts along Green Bay, may make a demand for the supplies on this road and increase the bulk of its traffic.

—The Cambridge City Car Company, of Indiana, has been adjudged a bankrupt, on default, at the petition of the Mill Creek Lumber Company of Cincinnati.

RAILROAD GAZETTE

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A. N. KELLOGG, *Proprietor.*

S. WRIGHT DUNNING AND M. N. FORNEY, *Editors.*

W. H. BOARDMAN, *Acting Publisher.*

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## Editorial Announcements.

*Address.*—*The* RAILROAD GAZETTE *will be printed for the present in New York; our printing house in Chicago having been destroyed. All communications, therefore, whether editorial or business, should be directed to the New York office. The proprietor will receive subscriptions and advertisements at his office in Chicago, Nos. 63 and 65 South Canal street, but letters should be addressed to New York.*

*Correspondence.*—*We cordially invite the co-operation of the railroad public in affording us the material for a thorough and worthy railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.*

*Inventions.*—*No charge is made for publishing descriptions of what we consider important and interesting improvements in railroad machinery, rolling stock, etc.; but when engravings are necessary the inventor must supply them.*

*Articles.*—*We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.*

*Advertisements.*—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

### THE NEW JERSEY LEASE.

On the 18th ult., Chancellor Zabriskie, of the New Jersey Court of Chancery, rendered his decision on the application for an injunction to restrain the consummation of the lease of the property of the United Companies of New Jersey to the Pennsylvania Railroad Company. This decision, which was very long, we hope to give in full, or in part, at an early day. The points decided are as follows:

1. That the act of 1870 gives the power to the United Companies to lease to a corporation of another State.
2. That their works form both connected and continuous lines with the works of the proposed lease.
3. That the directors of these companies have power to sell or otherwise dispose of all the property of the companies, except the roads and canal and the franchises granted, without the consent of the State or of all the stockholders.
4. That they have power, by consent of the State and a majority of the stockholders or of any other corporation required by law, to sell or lease or otherwise dispose of these works or to abandon them.
5. That a lease made by virtue of such authority is within the power delegated to the directors, and that there is in their charter no express or implied contracts violated by it; and, therefore, the act authorizing it is not unconstitutional.
6. That the purpose for which these works are leased, the benefit and advantages of extended public highways, controlled and operated by one head, for regular and easy communication from and through New Jersey and other States, is evidently a public use for which property may be taken on compensation.
7. That even if the directors have not power to lease for a term, so as to bind the stockholders or their successors, that the leasing and delivering the works to the lessees, with a stipulation and obligation to have the shares of dissenting stockholders valued and paid for, is not taking property without first making compensation.
8. That the Pennsylvania Railroad Company, the proposed lessee, has, by its charter and supplements and the public laws of Pennsylvania, as constituted by the laws of that State, power to take this lease and bind itself to all its stipulations.

With regard to the complaint that such a lease to a corporation of surpassing power and of another State is against public policy, the Chancellor says that this is a matter for the decision of the Legislature, and that it has evidently decided by specially authorizing such a lease.

The complainants petitioned for an appeal to the Court of Errors of New Jersey, and asked for an injunction until the meeting of the court. The injunction was denied. It is reported that the case will be carried not only to the Court of Errors but to the Supreme Court of the United States, so that the legality of such consolidations may be finally settled.

The transfer of so important a system of railroads (for it is important rather than large) to a corporation controlling already several thousand miles of road, has caused much comment in the newspapers, and has been quite generally deplored. While hardly anyone denies the economy secured by unity and harmony in the operation of connecting lines, it is feared that the benefits will be dearly purchased by the evils which may flow from such an enormous concentration of power. It cannot be denied that evils of great magnitude may be inflicted, for a time, at least, by a corporation like the Pennsylvania Railroad Company, and it doubtless is one of the first duties of the community to contrive some plan whereby suitable checks will apply to such corporations in their changed circumstances. The consolidations and combinations, we believe, are the natural result of economical laws, and that our railroads will never be operated with the greatest efficiency and economy—that they will never serve the public as they should—until there is, at least, harmony in their managements. Just how this is to be secured without endangering the rights of the community the roads were designed to serve, we shall not here attempt to say. But one thing is certain; and that is, that the people of this country will not long endure any arrangement, legal or illegal, after it has been proved oppressive and tyrannical. Not all the constitutions and laws in existence will permanently preserve any iniquitous system whose burdens may be felt daily by almost every member of the community. That this should be so we do not say; that it is so, we do not doubt; and doubtless the knowledge that it is so will very much affect the management of even the most powerful and the most selfish of corporation officers. We do not mean that any action of railroad companies, however unjustifiable, would be likely to result in any popular violence; but there is possible in this country what may be called "legal rebellion," which, in no very long time, might change whatever in constitution or laws stood in the way of the people's will.

That the lease of the New Jersey roads to the Pennsylvania Railroad Company is likely to result in any change for the worse in the management of those roads, we do not believe, but the contrary. The lease is made at a high rental, but not more than the roads have been earning. It is a mistaken view which regards it the interest of the Pennsylvania Railroad Company to discriminate against the local traffic of these roads. On the other hand, it will be its interest to develop that traffic to the utmost extent; and we shall be disappointed if the roads are not better equipped, better managed, with faster passenger trains and more complete station and other accommodations than ever before. There should be between New York and Philadelphia the fastest train in America; and there are many improvements which can be made now which the United Companies were not justified in making; and others which the competition that the Pennsylvania road meets will compel it to make.

### VENTILATION.

In another column we publish a very excellent letter from Mr. Leeds, in which he relates his experience in sleeping cars, and makes some such very practical suggestions that, were it not that we have had experience ourselves in endeavoring to inculcate some knowledge on this same subject, we would conclude that no person who is ever obliged to ride in a railroad car would refuse to profit by what he says. Our acquaintance with railroad conductors is not very extensive, but, reasoning alone from our experience while traveling, the inference that there is some sort of mental obliquity in their minds, which prevents their believing the truth regarding the importance of fresh air, might be drawn without much distortion of the evidence which we have thus accumulated. The degree of ignorance and indifference which exists on this subject is perfectly appalling when we consider the amount of sickness and suffering caused thereby, and which might be avoided by a very little exercise of intelligence and care. If forty average American citizens occupy a close car for twelve hours, it will be found that on an average not more than about five per cent. of them will indicate the slightest concern about the quality of the air they breathe. Even those who are supposed to have more intelligence than their associates will often be entirely indifferent about it, and conductors of trains usually do not pay the slightest attention to the ventilation of their cars. Even the builders of cars are often entirely ignorant of the first principles of ventilation and will stare with an incredulous frown at your temerity if you venture to suggest that to *keep the air of a car or any other apartment pure a constant supply of fresh air must be supplied.* We have italicised this, and are half-disposed to have it "displayed" in what printers call "long primer gothic," and would do so if we thought it would make it any more impressive. It may seem like a waste of words to urge this upon the attention of our readers, and yet, self-evident as it may seem, there are multitudes who do not believe it in the sense in which faith implies any corresponding "works." The common impression is that any apartment can be ventilated by simply making a hole in the upper part. Now, supposing you had a fish-pond well supplied with fish and filled with impure water which was killing the fish, how would you set to work to purify the water? In the first place, you could not empty out all the impure water at once, because the fish would die for want of their proper element. The only way to do would be to admit a stream of pure water into the pond at one end, and open a channel for the escape of that which is impure at the other. The same thing should be done in any apartment to keep the atmosphere pure, whether it be an opera house or a railroad car. There should always be an opening for the admission of pure air and one for the escape of that which is impure, just as in the fish-pond the water must enter at one place and escape at another. Singular as it may seem, we believe we are entirely correct when we say that, taking all the passenger cars now running on steam railroads in this country, ninety-nine in every hundred have no provision at all for the *admission* of fresh air. That is left almost entirely to accident.

Mr. Leeds' suggestion about opening the window in front of the stove and closing the blind, provides for this want in a very simple way and without any expense. Although we are not able to indorse quite all that he says in relation to the injurious effects of warmed air, nor do we believe that his expedient will work satisfactorily under all circumstances, yet that it will be very efficacious in nearly all ordinary winter weather any one can convince himself simply by making the experiment. Let any superintendent, master mechanic or conductor, take two well-filled cars in any train, open the front and back windows in one of them, and close them in the other, and after riding on the platform for a time, so as to be able to detect the difference, let him enter each one. We think it will be as plain to him as the nose on his face, or rather as plain as the said nose can indicate a difference. About a year ago we made a suggestion that placards with the following inscription should be printed and put up at each end of the cars:

TO VENTILATE THE CAR IN WINTER,
OPEN THE WINDOW IN FRONT OF THE FRONT STOVE AND THE ONE BEHIND THE REAR STOVE AND CLOSE THEIR BLINDS.

We were indebted to Mr. Leeds at that time for suggesting this means of ventilating cars, for which, perhaps, we are rather late in giving him credit, but which is due him nevertheless. We renew our suggestion of the cards, and hope to hear that it may be tried by some one, as the expense of doing so would be almost nothing.

With reference to sleeping cars, it seems as though it would be to the interest of the powerful company which now controls them to adopt some measures which will insure their more perfect ventilation and more temperate heating. With all their luxurious furniture, crimson and gold, purple and fine linen, we never heard of such a thing in one of them as a thermometer of any kind. What is especially needed is a self-registering instrument which would indicate the highest and lowest temperature.

We have intimated that we could not quite agree with Mr. Leeds with reference to his remarks about the injurious effects of warmed air. We can hardly say that we are prepared to deny the fact which he asserts, but if it is a fact, we do not think he has given us the evidence by which its truth is sustained. We would be glad to have him elucidate this point further.

### St. Louis & Southeastern Railway.

The Evansville Division of this line is now completed and in operation. It gives a route from St. Louis a little south of east to the Ohio River at Evansville, Ind., about 160 miles long. The part from St. Louis to Mount Vernon, Ill., 76 miles, was completed last year, the rest has been built during the current year. In connection with the Evansville, Henderson & Nashville Railroad, which has been in operation some time, the new road forms a route between St. Louis and Nashville 317 miles long, which is 60 miles shorter than the route by the Iron Mountain road.

From St. Louis to Belleville, 15 miles, the road is close to the line of the St. Louis, Belleville & Southern Illinois road. It diverges gradually from it at Belleville, and at Ashley, on the Illinois Central 60 miles from St. Louis, it is 20 miles north of that road, and about the

same distance south of the Ohio & Mississippi. There is no parallel road near it thence to Evansville, but it crosses the St. Louis & Southeastern nearly at right angles at Enfield, 50 miles southeast from Ashley, and about 45 miles south of the Ohio & Mississippi. It will have completed this season a branch from McLeansboro, 100 miles from St. Louis, southeast 40 miles to Shawneetown, which will be nearly parallel with and only about ten miles west of the Illinois Southeastern, and the company has arrangements made by which it will have another branch, more properly termed the main line, perhaps, from Mount Vernon (76 miles from St. Louis) nearly due east to New Albany, Ind., opposite Louisville, which will probably have a connection with the Chesapeake & Ohio, and form the shortest route from St. Louis to the seaboard. The Shawneetown line it is proposed to extend southeast in Kentucky about 40 miles, so as to make a shorter line to Nashville, and open a short route from the fine Kentucky coal mines to the Ohio.

Secure eastern outlets to all the various branches will much improve this property, as the tendency of produce in the country through which it runs is not westward but eastward.

### The Atlantic & Great Western Railroad.

The steps for the reorganization of this company are being taken. First, the companies of the several States (the Atlantic & Great Western of Ohio, Pennsylvania and New York) are reorganized separately, after which they are to be consolidated into one company. The Ohio company organized on the 19th ult., by the election of Gen. George B. Wright, Columbus, Ohio, President, and J. H. Dynes, of Lebanon, Ohio, Secretary. It is understood that the President of the consolidated company will be Gen. George B. McClellan, of New York, and that Gen. Wright will be made the Vice President and active manager of the company, with headquarters in Cleveland.

General Wright has been for some years the Commissioner of Railroads and Telegraphs of the State of Ohio. His reports have been very valuable additions to our railroad statistics, and he has manifested in his official capacity a knowledge of the complex business of transportation, and a strength and integrity of character, which argue well for the future management of the Atlantic & Great Western Railroad. Mr. Dynes, who, we understand, is to be Secretary of the new consolidated company, has been General Wright's secretary in the State Commissioner's office.

## NEW PUBLICATIONS.

*The Commercial and Financial Chronicle*, in its number for October 28, gives the completest tables of railroad, State, city and miscellaneous securities that ever have been published in America. Some idea of their extent may be formed from the fact that they occupy fourteen of the *Chronicle's* large pages. The railroad stock and bond list alone covers nearly four pages, and the information which it gives is more complete than can be found elsewhere. The columns are headed "description," "miles of road," "date of bonds," "size, par value," "amount outstanding," "rate per cent" (of interest or dividends), "when payable," "where payable and by whom," "*bonds*, principal when due; *stocks*, last dividend," "remarks." The roads are arranged alphabetically, and under each name are given all the different securities, the number of miles covered by each mortgage being given. A preliminary table gives an index to roads which are included in the list with others with which they have been consolidated. The remarks are frequently quite full, and altogether the list gives an immense deal of information concerning the financial condition of the railroads, which, as it is to be published monthly, will doubtless soon be made as correct as a table of this kind can be, and be brought down to the latest moment.

As an example of the manner in which the tables are made, we copy what is said of the Chicago & Alton Company in the first column of the table headed "description," and the last column, headed "remarks:"

DESCRIPTION.

*Chicago & Alton*—common stock.
Preferred stock.
1st mortgage, preferred, sinking fund.
1st mortgage.
Income bonds (a 1st lien on the road).
Joliet and Chicago, 7 per cent. stock.
do. do. 1st mortgage, sinking fund.
St. L., Jacksonv. & Ch., 1st M., guaranteed by C. & A.
do. do. do. do. indorsed by do.
do. do. do. 2d M., guaranteed by do.
Louisiana & Mo., 1st M. (in progress).

REMARKS.

Joliet & Chic. RR., leased for int. on stock and bonds. St. L., Jack. & Chic., leased at $240,000 per yr. Louisiana & Mo. RR built and operated under contract. Net earnings of C. & A. in 1870, $2,063,293. Dividend in 9 yrs. 78 per cent. on com. stock and 79 on preferred. See *Chronicle*, Vol. 12, p. 369.

It will readily be seen how exceedingly convenient and useful these tables will be; and it is a matter for congratulation that it has been undertaken by the *Commercial and Financial Chronicle*, which has won a deserved reputation for carefulness, accuracy and honesty. We have had occasion to examine it with some care for some years, and have found it the one financial journal that can be trusted.

## AMONG THE SHOPS.

### THE CHICAGO, BURLINGTON & QUINCY CAR-SHOPS.

Before the great Chicago fire we visited Aurora and examined the shops of the above company, and made copious notes of the locomotive department, which were written out and published in the GAZETTE of October 8. The greater part of the edition of this number was destroyed in the fire, and therefore most of the matter in it, including our description of the locomotive shops, has been reprinted in our last issue. The memoranda of the car-shops made at the time of our visit to Aurora were not nearly so full as those made in the other department. The former were not written out before the fire, but were among the few things saved from destruction. With the time and events which have intervened, it is not easy to fill up the unrecorded things we saw, nor to remember all that would have interested our readers.

The car-shops are nearly all wooden buildings, and therefore have, for some time past, been regarded as only temporary structures. The executive officers—Mr. Jauriet, of the locomotive department, and Mr. Wilcox, of the car-shops—however, show astonishing capacity in doing a large amount of work with very limited shop facilities.

There were in the shop and in progress when we were there, three Pullman parlor-cars, 60 feet long x 10½ feet wide; 2 Pullman sleeping-cars, 56 feet x 10½; 2 smoking-cars, 2 baggage and express cars, 1 mail-car, 5 ordinary day cars, and 3 day cars, just completed. The latter were finished inside with walnut and butternut panels and imitation ebony mouldings. The seats are placed 32 inches from center to center. The flooring in the aisle is of ash, and that under the seats of pine. The water-closets are paneled with cedar, and have a very good arrangement for ventilation. It consists of a pipe leading down to a convenient point and with an exhaust hood at the top. The effect is to exhaust all the air through this channel, instead of allowing it to enter the car.

A modification of the Ruttan ventilator is used on these cars both for warming and ventilating, in winter and summer. The car is warmed in this system by air which is supplied to the stove by a hood on top. In summer it is passed over water to remove the dust. The exhaust opening for the air is at the floor. Some of the older cars built on this road were without any exhaust ventilators at the top, as recommended by Ruttan himself. We have traveled in some of these, when either the supply of air had been neglected, or the arrangements were out of order and the car filled with passengers, and have found that the atmosphere soon became very impure; but the cars built at present have exhaust ventilators at the top as well as at the floor, and, if properly attended to, the whole arrangement works very satisfactorily. The danger is, that through carelessness or ignorance the attendants will shut off the supply of air and close the exhaust. On the Chicago, Burlington & Quincy road they are a much better trained set of men than on most other lines, so there is less difficulty with this ventilating apparatus than might be experienced elsewhere. That with proper attention this system will keep the air more pure than almost any other in use we know from experience. We doubt, however, whether a car can be well ventilated without exhaust openings at the top, in addition to those at the floor. The latter accomplish an excellent purpose in winter, by exhausting the cold air from the floor, where it is sometimes fifty degrees colder than at the top, and such openings could be applied with great advantage to any car warmed by ordinary stoves. There is, however, one defect, we think, in the application of the Ruttan system to the cars described. We refer to the fixed hoods on top, which take in the air that is supplied to the stove, and allow it to escape from the exhaust. The hoods have wide openings, with about 190 square inches area. Being fixed, if there is a strong head wind, a great deal of air will be admitted, probably more than can be warmed, in which event the damper is sure to be closed and no fresh air supplied. With a strong side wind, very little air will enter. In either event, there will be trouble in warming and bad ventilation. We have seen on some other roads a hood which is movable, and to which a vane is attached, so that the mouth will always face the wind. Where these have been used air openings with only about 70 square inches area have been found sufficiently large to supply air, and do so with much more uniformity than fixed hoods with much larger openings. A movable hood can also be used for supply or exhaust by simply changing the position of the vane. They have sometimes been abandoned on account of the very flimsy way in which they have been made. It should be remembered that they must be carried through all kinds of gales—sometimes at the rate of forty miles an hour—and therefore will not last long if constructed of ordinary stove-pipe workmanship. The working parts, to stand the wear and tear, must be fitted as carefully as steam engine work, and be made sufficiently strong for the "stress of weather" to which they will be exposed.

The finish of the cars built at the Chicago, Burlington & Quincy shops is very neat, without much pretense to ornament. The Miller platform is used on all passenger cars, and the Westinghouse brake on most of their trains. Every improvement which is really valuable is used on this road, and the work is of the very best description. Their iron passenger-car trucks are the best we have seen. They are built with four or six wheels, and we have been promised a drawing of one which we intend to have engraved.

We saw the old sleeping-car "Aurora," built in 1866, in the shops for repairs. It was one of the first of the present style of Pullman sleepers. It is 66 feet long, with eight-wheeled trucks; has the Westlake heater, which, as many of our readers know, is placed underneath the body of the car. It is a warm-air heater, and was introduced on a number of Western roads a few years ago, but has not been used very generally since. The body of the "Aurora," after five years of constant service, and notwithstanding its great length, is still as straight as when first built, which is strong testimony to the quality of the workmanship done in these shops.

The buildings which are occupied by the car department, like those of the locomotive shops, are very much crowded. The latter are, however, very good permanent stone structures, their only fault being that there are not enough of them. The car shops on the other road are all wooden buildings, with the exception of the blacksmith shop, which is comparatively new and built of brick. Every nook and corner of the wooden buildings is occupied, and we have seen here in some of the hottest days in summer, men employed in lofts immediately under the roof, where no human being should be required in such weather to work for ten hours each day. We are glad, therefore, to hear that the authorities of this company contemplate the erection at no very distant day of new and more commodious and permanent buildings for their car department.

After going through these shops, it is surprising to hear that all the work given in the following list could have been done in them during the past year:

PASSENGER CARS.

Two sleeping cars, 4 baggage cars, 4 day cars and 4 way cars for the Missouri River, Fort Scott & Gulf Railroad. Ten day cars, 6 baggage cars and 5 way cars for the Leavenworth, Lawrence & Galveston Railroad. Two baggage and 6 day cars for the Burlington & Missouri River road. One day car for the Atchison & Nebraska road. Four day cars for the Chicago, Dubuque & Minnesota road. Two parlor, 3 sleeping, 22 day, 2 dining, 1 refrigerator, 1 directors' car 8 baggage and express and 13 way cars for the Chicago, Burlington & Quincy road. Making in all 100 cars.

FREIGHT CARS.

Fifty platform cars for the Chicago, Burlington & Quincy road; 69 coal cars for the Chicago & Wilmington Coal Company; 75 coal cars for the Missouri River, Fort Scott & Gulf road; 100 stock cars and 1 wrecking car for the Leavenworth, Lawrence & Galveston road; 75 stock cars for the Burlington & Missouri River road; and 25 stock cars for the Burlington & Missouri River Railroad in Nebraska. Making 395 freight cars.

In addition to this new work they have overhauled, renovated and repainted 58 day passenger-cars, 40 baggage, mail and express cars, 35 way cars, and 13 Pullman sleeping cars, and have kept up the repairs on 2,100 box freight and 800 platform cars. We doubt whether any other one railroad shop in the country can show an equal amount of work done, which, considering the shop facilities, is very extraordinary.

The following is a list of the officers and foremen in this department:

W. W. Wilcox, superintendent; T. W. Bissell, draftsman; C. E. Hanson, book-keeper; Edward Polleys, foreman of woodwork; L. W. and Robert Campbell, foremen of machinists; Jas. Flowers, foreman of blacksmiths; John Andrews, foreman of upholsterers; D. C. Cooley, foreman of painters; C. Schickler, of cabinet-makers.

The work which is done under the direction of these men reflects great credit upon them. In going through the shops any mechanic would be struck with the number of neat and ingenious devices which have been adopted, indicating that in doing work here, those in charge do not follow blindly in the beaten track of others, but exercise their own ingenuity to a very considerable extent. Among these we noticed a carrier for bell ropes. In a car with a raised roof, it is necessary to supply some means to keep the rope in line with the openings over the doors. If they are suspended by a strap, in drawing the bell-rope through rapidly the metallic end is frequently thrown violently against the head-lining, which we have frequently seen torn by this means. If, on the other hand, the hanger is rigid, it is often broken by the rope being wound and twisted around it. The carriers used in the Chicago, Burlington & Quincy cars are made of metal, but hinged to the roof, so that they can swing longitudinally, thus obviating to a very great extent the difficulty with the perfectly flexible and the perfectly rigid carriers.

In speaking of the ventilation we omitted to refer to the dust-hoods which are used between the cars. These have been used on many other roads, but are seldom kept in such good condition as on the Chicago, Burlington & Quincy cars. They consist of a strong canvas covering projecting from each end of the cars and supported by suitable frames, and pressed together by spiral springs, so that no cinders can fall between the cars. The Miller platforms fit together so closely that but little dust can rise, so that the platforms are well protected from both dust and cinders.

WM. C. BEMENT & SON, PHILADELPHIA.

This establishment is working up to very nearly its full capacity, and employs about 350 men. It is busy on orders for the Pennsylvania, Erie, Baltimore & Ohio, Chesapeake & Ohio, New York & Oswego Midland, Morgan's Louisiana & Texas, Flint & Pere Marquette, Detroit, Lansing & Lake Michigan, Boston & Albany, Lake Shore & Michigan Southern, New Haven & Northampton, Maine Central, Great Western of Canada, Chicago, Burlington & Quincy, Northern Pennsylvania, Northern Central, and Cleveland & Pittsburgh railroads.

The firm is building a frame slotter for the Hinkley & Williams Locomotive Works of Boston; a radial drill for the Rogers Locomotive Works of Paterson; a wheel lathe and frame slotter for the Rhode Island Locomotive Works of Providence; a connecting-rod-planer and steam-hammer for the Brooks Locomotive Works of Buffalo; and a plate-planer for the Pittsburgh Locomotive Works.

Besides these orders, it has work in progress for the Tredegar Company of Richmond, Gill & Bidwell, of Pittsburgh, and other car builders, besides orders from iron and steel manufacturers, rolling mills, steam-engine and ship builders, bolt works, and the navy department. It has also orders from the American Bridge Company, and Wells, French & Co., of Chicago, and McNairy, Claflen & Co., of Cleveland, and other parties.

THE JACKSON & SHARP COMPANY, OF WILMINGTON, DEL.

This company is building narrow (3ft.) gauge passenger and

baggage cars for the following roads: Denver & Rio Grande, Central Valley of New York, Tuskegee Railroad of Georgia, Rio Grande of Texas, Arkansas Central, Cherokee of Georgia, Kansas City & Memphis, Bainbridge, Cuthbert & Columbus of Georgia, Painsville & Youngstown of Ohio, Utah Northern, and Little Rock, Pine Bluff & New Orleans. Besides these, they are also building a number of cars for roads of the ordinary 4ft. 8½ in. gauge. Their shops have a somewhat odd appearance with the small cars, and tempt one to think that one has entered some land of Lilliputian engineering. We do not believe much in narrow-gauge roads, but those who do, and want narrow-gauge cars, will now find some of the best specimens which have yet been built for such roads at Jackson & Sharp's shop.

MOUNT CLARE SHOPS OF THE BALTIMORE & OHIO RAILROAD.

Unusual activity prevails at present in these shops. The opening of the Pittsburgh & Connellsville Railroad has made very heavy demands for cars and motive power. About 1,600 men are employed and three ten-wheeled engines and fifty-five freight cars are built per month. Eighteen or twenty passenger cars are in progress, and four spans of iron bridges are now in the yard. We expect to give a full description of these shops within a few weeks.

## The Massachusetts Conference on Increasing the Safety of Railroad Travel.

An exchange gives the following report of the conference of the railroad managers of Massachusetts with the Railroad Commissioners of that State, held September 18, at the call of the Commissioners:

The railroad companies were represented as follows: Boston & Albany, by Chester W. Chapin, President, and D Waldo Lincoln, Vice President; New Bedford & Taunton, by Warren Ladd, Superintendent; Boston & Maine, by Francis Coggswell, President, and William Merritt, Superintendent; Eastern, by George M. Browne, President, J. Prescott, Superintendent, and Henry L. Williams, Director; Connecticut River, by Daniel L. Harris, President; Cape Cod, by E. N. Winslow, Superintendent; Fitchburg, by Charles L. Heywood, Superintendent, and E. Haskett Derby, Attorney; Old Colony & Newport, by William H. Bullock, Superintendent, and W. F. Choate, Attorney; Worcester & Nashua, by Thomas Kinnicut, President, and C. S. Turner, Superintendent; Providence & Worcester, by William Hilton, Superintendent; Boston, Hartford & Erie, by William M. Parker, Superintendent, and Mr. Clark, of the trustees; Hartford & New Haven, by W. P. Burrell, President; Taunton Branch, by A. E. Swasey, Superintendent; Boston & Providence, by Hon. John H. Clifford, President, and A. A. Folsom, Superintendent; Providence & Stonington, by J. B. Gardner, Assistant Superintendent.

After the meeting was called to order, Mr. Adams, one of the Commissioners, addressed it, referring to the duties of the Board, its wish that the leading railroad managers should co-operate with it, recommending necessary legislation for the general good, and suggesting the formation of a committee representing the railroad corporations, to which the Commissioners could refer for suggestions and advice, in the future. After Mr. Adams had closed, several prominent gentlemen addressed the meeting,

Mr. Chapin said he agreed with the suggestions offered by the Commissioners. He knew but little concerning the disaster on the Eastern Railroad, having heard of it by telegraph in England; it gave him great uneasiness, and on reading in the circular of the Commissioners that the accident was as likely to occur on either of the railroads in Massachusetts as the Eastern, he was of the opinion that something ought to be done, and at once, He defended his own road from this general charge, and expressed his own belief that all roads had the precaution of time at which one train shall follow another.

General Stark, in behalf of the Lowell road, said that while he was willing to aid the Commissioners in their efforts to improve the railroad system of the State, he desired to deprecate the assertion contained in their circular, that no single road in Massachusetts had sufficient safeguards for the protection of passengers. He thought the Commissioners were unnecessarily alarming the public, and he protested against the course which they were pursuing. The Lowell road had many safeguards not provided by other roads.

Mr. Clifford agreed with Mr. Chapin in respect to the causes and consequences of the disaster. He also agreed with General Stark in saying that at a time like this, when the tone of the public mind was in an abnormal condition, everything should be done to allay the fears of the community instead of increasing the alarm. He had always regarded the constitution of the Board of Commissioners with favor, but a false inference might be drawn from the circular which they had issued. The proportion of accidents on railroads in Great Britain was seven to one compared with Massachusetts, where twenty-three and a half million passengers had been transported and not a single accident occurring to a passenger in his seat in the cars. He referred to the several kinds of brakes used on the Providence road, and said that he would prove all things, and hold fast to that which was good. In conclusion, he moved the appointment of a committee of three to report a committee, to co-operate with the Commissioners in their efforts and the motion was adopted.

Mr. E. H. Derby made a few remarks, suggesting to the Commissioners that in making recommendations as to the management of roads they should distinguish between single and double-track roads, and he incidentally spoke of the good management of the Fitchburg road, on which, from 1844 to the present time, a passenger in his seat in the cars had never been killed.

Mr. J. B. Winslow, Superintendent of the Lowell road, entered his protest against the wholesale statement of inefficiency of management of all the roads in the State, and said that since the road with which he was connected was opened in 1835 no passengers in the cars had been fatally injured.

A committee of five was then chosen consisting of Hon. John H. Clifford, of the Boston & Providence; D. Waldo Lincoln, of the Boston & Albany; John B. Winslow, of the Boston & Lowell; William Merritt, of the Boston & Maine, and Daniel L. Harris, of the Connecticut River Railroad.

# General Railroad News.

## ELECTIONS AND APPOINTMENTS.

—The annual meeting of the stockholders of the Central Park, North and East River street railroad company, whose lines form what is known as the "Belt Railroad" in New York, for the election of directors, was held October 24, and the following ticket was unanimously elected: Francis Skiddy, Benjamin H. Hutton, Abijah Custiss, Augustus L. Brown, Owen W. Brennan, Cummings H. Tucker, John Adriance, George K. Sistare, Henry W. Smith, John T. Terry, Peter C. Washington, William R. Stewart and Charles G. Clark.

—William Gooderham, Jr., of Toronto, has been appointed Managing Director of the Toronto & Nipissing Railway.

—At a meeting of the stockholders of the Knox & Lincoln (Maine) Railroad Company, held at Bath October 2, the following gentlemen were unanimously elected directors for the ensuing year: Oliver Moses, Edward Sewall, Bath, Me.; Henry Ingalls, Wiscasset, Me.; Edwin Flye, Newcastle, Me.; D. W. Chapman, Damariscotta, Me.; Joseph Clark and Edmund Wilson, Thomaston, Me.; Francis Cobb, Rockland, Me.; and Geo. W. Kimball, Jr. At a subsequent meeting of the directors Oliver Moses was re-elected President and Edward Flye Clerk.

—Mr. William E. Porter, for a number of years Assistant Supervisor of the Baltimore & Ohio Railroad, has resigned the position, and Mr. John Bradshaw, Superintendent of the bridges at Parkersburg and Bellaire, has been appointed to fill the vacancy.

—The following gentlemen were elected Directors of the Cincinnati & Great Northern Railroad Company on Saturday, September 30: Col. S. W. Morton, Gen. J. C. Fremont, Judge J. C. McKeemy, Jas. T. Brady, Esq., Hon. F. C. Le Blond, Gen. Durbin Ward, W. A. Weston, Judge A. S. Latta, Davis Johnson, A. J. Hodder and H. D. Faulkner. At a subsequent meeting of the Board, Col. S. W. Morton was elected President; Jas. T. Brady, Esq., of Pittsburg, Treasurer, and Hon. T. Wrightson, Secretary.

—The annual election for nine Directors of the Pacific Mail Steamship Company will be held at the office, Nos. 59 and 61 Wall street, New York, on the 15th inst. The transfer books will be closed on the 6th and opened the day after the election.

—Hugh Riddle, for two years past General Superintendent of the Chicago, Rock Island & Pacific Railroad, and formerly Superintendent of the Erie Railway, has been chosen Vice-President of the Chicago, Rock Island & Pacific Railroad Company in place of Ebenezer Cook, deceased.

—Mr. Ramsbottom, having retired from the service of the London & Northwestern Railway Company, the directors have appointed Mr. F. W. Webb to succeed him as Superintendent of the Locomotive Department.

—Mr. William G. Peck, late General Freight and Ticket Agent of the New London Northern Railroad, of Connecticut, has been appointed Superintendent of the New Jersey Southern.

—Governor Palmer, of Illinois, has appointed Wm. P. Holliday, John Stichey and M. C. Crawford directors of the Cairo & St. Louis Railroad Company; also George S. Owen and Robert L. Hundley directors of the Carbondale & Shawneetown Railroad Company.

—Mr. Horatio Allen was elected President of the American Society of Civil Engineers at its annual meeting, held in New York, November 1.

## TRAFFIC AND EARNINGS.

—The earnings of the Kansas Pacific Railway for August, as compared with the same month last year, are as follows:

| | |
|---|---|
| Earnings, August, 1871 | $328,000 |
| Expenses | 164,000 |
| Net earnings | $164,000 |
| Expenses for August, 1870 | $227,000 |
| Expenses for August, 1871 | 174,000 |
| Decrease in expenses for corresponding month of August. | $53,000 |

In 1870 the road was unfinished, and consequently the earnings cannot be comparatively shown with any degree of fairness. The earnings for the first week in September, 1871, were $82,085.30. The months of September, October and November, it is believed, will show additional earnings with but little increase in expense.

—The total number of Texas cattle that have passed through Wichita, Kansas, this season, and departed upon railroads to reach the Eastern markets, is something over 400,000 head.

—The Reading Railroad Company advanced prices fifteen cents per ton on October 1. It was expected by the miners that twenty cents would be paid, and there is, in consequence, considerable excitement among laborers.

—On June 30 last there were over 50,000 miles of railway postal routes in operation in the United States, as compared with 34,000 miles on the same date in 1858; and during the fiscal year 1870–71, just closed, the number of miles of railway over which the mails were carried was 107,000,000, an increase of 32 per cent. over the number of miles for the fiscal year of 1867–68.

—The traffic receipts of the Great Western of Canada for the week ending September 1 amounted to £19,215, against £18,097 in the corresponding week of last year, showing an increase of £1,118, or 6 per cent.

—The traffic receipts of the Grand Trunk of Canada for the week ending September 2 amounted to £34,100, against £29,800 in the corresponding week of last year, showing an increase of £4,300, or 14 1-3 per cent.

—The traffic receipts of the Great Western of Canada for the week ending September 8 amounted to £21,418, against £17,448 in the corresponding week of last year, showing an increase of £3,970, or 22½ per cent.

—The traffic receipts of the Grand Trunk of Canada for the week ending September 9 amounted to £34,300, against £30,500 in the corresponding week of last year, showing an increase of £3,800, or 2½ per cent.

—The Georgetown (British Guiana) *Gazette* of August 5 says: "We have pleasure in stating that recently Mr. McGilvray, the agent of the great shipowners, Messrs. Cunard, Burns & McIver, arrived in this colony to try and make arrangements for the establishment of a line of steamers between the Clyde, Barbados, Trinidad and British Guiana, and perhaps other places. The first place of call will be Barbados, and the steamer will thence proceed alternately to Trinidad and this colony, there being some probability that a branch steamer will go from Trinidad to La Guayra. The steamers are to be first-class vessels of about 2,000 tons each, fitted with the latest improvements, and they will take freight out and home."

—The Evansville & Crawfordsville Railroad, for the year ending Sept. 30, 1871, reports as follows:

| | |
|---|---|
| Total earnings | $538,173 23 |
| Operating expenses | 368,025 87 |
| Interest and taxes | 111,147 59 |
| Appropriation to sinking fund | 29,987 00 |

—The earnings of the St. Louis & Iron Mountain Railroad for the third week in October, 1871, were $46,074; do., 1870, $31,240 58; increase, $14,833 42. Earnings from January 1 to October 23, 1871, $1,276,411 15; do., 1870, $1,077,468 04; increase 1871, $198,943 11.

—The traffic receipts of the Grand Trunk of Canada for the week ending September 30 amounted to £41,200, against £33,200 in the corresponding week of last year, showing an increase of £8,000, or 24 per cent.

—The traffic receipts of the Great Western of Canada for the week ending September 29 amounted to £23,577, against £17,023 in the corresponding week of last year, showing an increase of £6,554, or 38½ per cent.

—Teams are hauling flour and bacon from the terminus of the Missouri, Kansas & Texas Railway, near Fort Gibson, for 200 miles south into Northern Texas.

—The effect of the Chicago fire on the lumber traffic is seen by the following from the Grand Rapids (Mich.) *Eagle* of the 23d ult.: "The various railroad lines leading south from this city are taxed to the utmost to carry the lumber that is freighted on them. Long trains of cars, loaded almost exclusively with lumber, are sent out every day. The many mills have been running busily during the entire season, and yet there is a reasonable apprehension that there will be scarcely enough for home consumption, so great has been the demand abroad."

—The Secretary of the Treasury has suspended the operation of the instructions of the department of the 4th inst., which require, after the 1st of December, the use of the American seal lock on cars conveying domestic goods through Canada, until the 1st of February. At that date further instructions will be given.

## OLD AND NEW ROADS.

Missouri & Kansas Southern.

Under this name a company has been organized in Kansas which hopes to construct a line from the Kansas River, in Kansas, in a southeasterly direction, *via* Osage Mission and Girard, Kansas, through the counties of Barton, Dade and Greene, Missouri, to Springfield, there to connect with the Atlantic & Pacific road.

Great Western of Canada.

This company has declared a dividend at the rate of 5½ per cent. per annum for the first half year of 1871. This delights the English stockholders, as well it may, considering the past dividends, which were 2 per cent. in 1868, 3 in 1869, and 4 in 1870. At the present rate of receipts, the second half year will justify a still larger dividend. Meanwhile, the road has been very greatly improved.

Chicago & Canada Southern.

Articles of confederation between the Chicago & Canada Southern Railway Company and the Southeastern Michigan Railway Company were filed in Columbus, O., on October 27. The capital of the consolidated company is $10,000,000. The road will be called the Chicago & Canada Southern Railway, with termini at Chicago and at a point on the Detroit River in the eastern part of Wayne County, Michigan. It is intended to form the western extension of the Canada Southern Railway, now under construction from the Detroit River to Fort Erie, opposite Buffalo, and will be remarkable for its very low grades.

Portland & Ogdensburg.

The adjourned meeting of this company met at Portland on Tuesday, October 23. The special object of the meeting was stated to be to determine in what manner the means for the further prosecution of the work on the road and for its equipment shall be raised, and to vote the power necessary therefor. President Anderson also presented a statement of the earnings of the road for the year ending September 30, giving a most favorable exhibit, and also a statement showing the excellent progress of the Western or Vermont Division of the road. A vote was then passed authorizing the issuing of bonds to the amount of $3,300,000, to include the mortgage of last July of $800,000, payable semi-annually, principal and interest in gold; the $2,500,000 to be applied to the completion of the road to the Connecticut River, and the $800,000 to liquidate the mortgage of that amount of last summer, the proceeds of which were used in building the line to Bartlett, N. H., the whole amount now voted to be secured by a complete and full first mortgage on the road from Portland to Connecticut River, located and to be located. There were a large number of shares represented. The vote was unanimous—7,593 ayes, no nays.

International Railway.

A Texas journal says that a force is now engaged in constructing this company's bridge over the Trinity River, which will be 13 miles west of Palestine, and about 65 miles northeast of Hearne.

**Atlantic & Ontario.**

A meeting of the directors of this proposed road was held October 21, at Ballston, N. Y., when, the necessary amount, $70,000, having been subscribed, the company was duly organized, and articles of association adopted. The following officers were elected: Col. T. C. Peck, of Ballston Spa, President; L. M. Crane, of Ballston Spa, Secretary; D. Hays, of Johnstown, Treasurer; H. R. Snyder, of Johnstown, Engineer; E. Appleton, of Boston, Consulting Engineer. The road is to begin at a point at or near Eagle Bridge, in Rensselaer County, and run thence westerly through Ballston to Salisbury, in Herkimer County, to a point at or near Oswego. The distance is seventy miles, and the road is to be constructed and eventually owned by Massachusetts capital. The survey is to be at once begun, so as to have the report and all documentary evidence ready to present to the Legislature of Massachusetts this winter. The object is to empty the produce of the Great West into Boston, through the Hoosac Tunnel, for the completion of which Massachusetts has expended $7,000,000.—*Albany Journal.*

**New Orleans, Baton Rouge & Vicksburg.**

A Southern newspaper reports that the bonds of this company are all placed in London, and that all preparations for the commencement of the work on the road have been made. The company only awaits the decision of the directors of the Texas Pacific Railroad Company, relative to the width of gauge to be adopted for that road, which will have a connection to New Orleans through the Baton Rouge line.

**Jackson, Lansing & Saginaw.**

Under date of October 10, official announcement is made that, "by an agreement between the Michigan Central and the Jackson, Lansing & Saginaw railroad companies, the road of the last named company is to be worked by the Michigan Central in future; and by the terms of that agreement, and for the purpose of extending the Jackson, Lansing & Saginaw road northerly, a new and consolidated mortgage is to be put upon the road for such an amount as will provide both a sufficient fund for the extension of the road as far north as the Straits of Mackinac, and also for the exchange of all outstanding bonds under previous mortgages, for the bonds under the new mortgage of a similar kind; that by the terms of the agreement, as may be done under the laws of Michigan, the Michigan Central Railroad Company may make its own bonds, to be secured by the same mortgage as the Jackson, Lansing & Saginaw, and issue the same in lieu of those of the Jackson, Lansing & Saginaw, if it should prefer so to do; that whether it does so or not will depend upon the action of those who hold the several classes of bonds already issued under the several mortgages upon the Jackson, Lansing & Saginaw road; that if the holders of these bonds shall elect to exchange them for the bonds of the Michigan Central, secured by a single first mortgage on the Jackson, Lansing & Saginaw, then it will issue its own bonds for the extension of the road, and also for the exchange of the outstanding bonds of the Jackson, Lansing & Saginaw Railroad Company, and otherwise not; and in order that it may determine whether it will or will not issue its own bonds under said mortgage, it is necessary that the holders shall signify, at an early day, their disposition in the matter.

"The bonds of the Michigan Central Railroad Company, to be issued, will be in sums of one thousand dollars each, and dated Nov. 1, 1871, payable in twenty-five years, interest at eight per cent. free of Government tax, payable semi-annually at its office in Boston.

"When exchange is made, it will be at par, interest to be adjusted."

Holders who wish to make the exchange are to address Isaac Livermore, Treasurer of the Michigan Central, Boston, on or before December 10.

**Baltimore Short Line.**

This company is to build a loop line for the Marietta & Cincinnati, making a short cut from Belpre, at the western end of the Parkersburg Bridge, to Athens, O., which will shorten the line between Parkersburg and Cincinnati materially. Proposals for grading eighteen miles of the road were opened last week.

**Nashua, Acton & Boston.**

Bids for the grading and masonry of about twenty miles of this road were received last month.

**Hudson River.**

The trains of this railroad (except specials) commenced running from the new depot in Forty-second street, New York, on Wednesday, the 1st inst.

**Cleveland, Columbus, Cincinnati & Indianapolis.**

The stockholders are informed that they have the privilege of subscribing at the rate of 75 cents on the dollar for one share of new stock for every five they now hold, and one share for every fraction of five shares greater than one-half, as registered in their several names October 20. One-half is to be paid before December 1 and the other half by February 1. Stockholders registered in New York will subscribe at the office of the United States Trust Company, No. 49 Wall street, New York, and all others at the office of the Treasurer of the company in Cleveland. No subscriptions will be received after December 1.

**Carthage Branch.**

It is proposed to construct a railroad under this name from Shreveport, La., or some point further west on the Texas Pacific, southwest about fifty miles to Carthage, Texas. N. R. Olcott, the chief engineer, reports that he has completed the location of the first division, in which there are but two curves, a maximum grade of less than 60 feet per mile, with exceedingly light work. He estimates the entire cost of construction of ten miles of 4ft. 8½in. or 5ft. 6in. gauge, at less than $150,000.

**Atlantic & Great Western.**

The New York corporation advertises that a meeting will be held at No. 11 Nassau street, New York, on the 6th inst., to take into consideration the agreement made by the directors for consolidation with the Pennsylvania company of the same name. This, of course, is only preliminary to the organization of the new company, which will own and manage the whole line from Salamanca, N. Y., to Dayton, O.

**Northern Pacific.**

Concerning the north and south line of this company on the Pacific coast, from the Columbia River at Kalama northward to Puget Sound, the Kalama *Beacon* of the 6th ult. says:

"Track-laying is daily extended northward and is now going over the piling toward the Kalama, at which place the bridge is finished and ready for the iron. We are further informed upon the most reliable authority, that on or before January next two first-class passenger-cars and two locomotives will arrive here for this division. From the same source we learn that 4,000 tons of railroad iron will at once be put in transit for this port, so as to be ready for the forty-mile extension northward from Toutle River. On the river bank, about half-way between the company's wharf and saw-mill, the material is being framed for a locomotive house and machine shop, which is to be 118 by 35 feet, and is to be reared within a week."

The track was completed by the middle of the month to a point within 48 miles of Morehead, which is the name of the place where the road will cross Red River.

**Wilmington & Augusta.**

It is proposed to change the gauge of the Wilmington & Manchester and the Charlotte, Columbia & Augusta roads, which, together, form an unbroken line from Wilmington, N. C, to Augusta, Ga., from five feet to the Northern standard gauge of 4ft. 8½in. There is now an unbroken line of that gauge from New York to Wilmington, and the proposed change would enable cars to run without transfer from New York, Boston, Philadelphia or Baltimore to Augusta. Thus the cotton received at Augusta might be shipped direct to Providence, Lowell or Manchester, and the saving of transfers and commissions would do much to meet the competition of the ocean route.

**Mobile & Northwestern.**

It is reported that Col. W. D. Mann, formerly an officer of the United States army, and since the war one of the most prominent business men of Mobile and proprietor of the Mobile *Register*, has taken the contract for the construction of the entire line of this road, from Mobile to Helena, Ark., about 350 miles, to be commenced at once. Part of the iron is now on the way from England.

**Houston & Texas Central.**

This railroad is now completed as far north as Corsicana, Texas, about 250 miles above Galveston, 150 miles north of Houston, 75 miles north of the International Railroad crossing at Hearne, and 25 miles north of the late terminus at Groesbeck.

The company advertises sealed proposals for the sale to the trustees of $140,000 of its sinking fund bonds, and of $40,000 of the bonds of its Western Division, which will be received, until January 1, at the office, No. 26 Exchange place, New York.

**Chester & Tamaroa.**

The road-bed of this line is now in readiness for the ties and rails between Chester and Pinckneyville. It has been in operation a few months from Pinckneyville to Tamaroa, Ill., where it connects with the Illinois Central.

**Grenada, Houston & Eastern.**

The Okolona (Miss.) *News* announces the arrival at that place of a corps of laborers, and their commencement of work on the Grenada, Houston & Eastern Railroad. Gen. Wm. F. Tucker is President of the road. Grenada is at the junction of the Mississippi Central and the Mississippi & Tennessee railroads, 100 miles a little east of south of Memphis by the latter road. Houston is the county seat of Chickasaw County, Miss., 65 miles east of Grenada, and Okolona, a station on the Mobile & Ohio Railroad 18 miles northeast of Houston.

**Southeastern Counties Railway.**

This Canadian Railroad was to be opened from West Farnham, on the Stanstead, Shefford & Chambly Railway, southeast about 30 miles to Richford, near the northern border of Vermont, on the 28th of September.

**New Jersey West Line.**

This company has awarded the contract for the grading and mason work of its road between Summit and Newark to John Rehill, of Easton, Pa., to be finished by the first of January next. From Summit to Bernardsville, about 25 miles, the track is laid with the exception of about three miles, and the company will soon finish the work there itself.

**White River Valley & Texas.**

The contract for grading from Des Arc north to Jacksonport, Ark., about 50 miles, is let to parties lately engaged on the Missouri, Kansas & Texas road. At Jacksonport the proposed road will connect with the Cairo & Fulton.

**Cairo & Fulton.**

It is now proposed to have the Mississippi River terminus of this railroad at Commerce, 20 miles northwest of Cairo, instead of Cairo, and to extend it thence southwest through Morley, on the Belmont line of the Iron Mountain road, and Bloomfield to Poplar Bluffs, Mo., where the Arkansas line of the Iron Mountain road will join it.

**Laclede & Fort Scott.**

The recent contract let by this company is reported to be for completing the grading of the Western Division from Lebanon to Fort Scott, and also for constructing, ironing and equipping the main line from Ste. Genevieve to Fort Scott, as rapidly as the work can be pushed. The contract also embraces the construction and equipment of a branch road from Bolivar to Baxter Springs, Kansas, as soon as the requisite amount of local stock has been subscribed. The contracting parties, embracing, among others, O. L. Grant and Charles W. Coleman, of Chicago, bind themselves to complete and equip the Western Division by the 4th of July, 1873, or sooner.

**The New Jersey Lease.**

The following is a summary of Judge Black's closing argument against the lease, with which the case was concluded:

First—That the Pennsylvania Company have no right by the acts of 1870-71 or '69 to accept this lease.

Second—That this was not a lease, but a purchase.

Third—The Pennsylvania Railroad does not come here for any private purposes, but for the purpose of taking possession of the highways of New Jersey, and her commerce and business.

Fourth—This is a part of the sovereignty of the State, and cannot he held by any body unless by direct grant made by the legislative power.

Fifth—The Legislature cannot delegate this power to agents. It cannot delegate its power, because it changes the organic law of the State.

Sixth—The Pennsylvania Railroad cannot be punished for any public mischief. They throw this responsibility upon the United Companies, who have stripped themselves of all power and property.

Seventh—New Jersey has never made this bargain or placed herself in this position. No thought of this kind ever entered into the mind of any member of the Legislature.

Eighth—Such power cannot be found in the act. Their whole claim for this immense power is based on ths word "otherwise."

Ninth—As a private contract it was void; but there are private rights which no power had a right to invade except by due process of law. Before the court would allow the smallest portion of the property of an individual to be taken, it would determine whether the Legislature had authorized such a proceeding, and whether the provision that no property shall be taken without due process of law is constitutional.

The case was here concluded, and the Chancellor reserved his decision.

**Atchison & Nebraska.**

A time table to take effect October 10 shows the road completed to Humboldt, Neb., and gives the following table of stations and distances:

| *Distances from Humboldt.* | STATIONS. | *Distances from Atchison.* |
|---|---|---|
| 0 | Humboldt | 75½ |
| 7¼ | Dawson's | 68¼ |
| 14½ | Salem | 61 |
| 20¾ | Falls City | 54¾ |
| 32¾ | Rulo | 46¾ |
| 40 | White Cloud | 35½ |
| 44½ | Iowa Point | 31 |
| 50½ | Highland Station | 25 |
| 53 | Fanning | 22½ |
| 59 | Troy Junction | 16½ |
| 62½ | Brenner | 13 |
| 69¼ | Doniphan | 6¼ |
| 75½ | Atchison | 0 |

The time table is for three trains each way daily: one freight, one mixed, and the other a mail and express, the latter making the distance between Atchison and Humboldt in 5¼ hours.

On September 17, Johnson County, Nebraska, voted, by a majority of five to one, $100,000 in bonds to this company. Every township in the county, except one, gave a majority for the bonds. The company has contracted to complete the road to Tecumseh, the county seat of Johnson County, 22 miles northwest from the present terminus at Humboldt and 97½ miles from Atchison, within ten months, and through the county within twenty months; but Col. Abel, of Atchison, who is building the road, says he will have the cars running to Tecumseh by the 1st of December next.

The Atchison *Champion* learns the iron was laid on the 30th of September over the bridge at the fourth crossing of Nemaha River, 1¼ miles from Humboldt and 74 miles from Atchison. The grading is done 9 miles beyond Humboldt, to Table Rock, and the grading contracts for the next fifteen miles, to Tecumseh, were to have been let this week.

**Atchison, Topeka & Santa Fe.**

The grading between Atchison and Topeka was finished on the 1st of October, and bids for the track-laying—to be done by the 1st of December—were received soon after.

The contract for laying the track between Topeka and Parnell Junction, near Atchison, has been awarded to H. F. Seldon, of Kansas City.

**Burlington, Cedar Rapids & Minnesota.**

This railroad was completed to Marble Rock, 45 miles northwest of Cedar Falls, October 7.

**Burlington & Southwestern.**

Harrison County, Mo., offers this company $100,000 if it will construct its road through Bethany, the county seat of that county, which is nearly north of Cameron and about 20 miles south of the Iowa line. This is farther north than it was originally intended to construct the road.

A force is at work constructing what will form a branch of this road through Putnam and Sullivan Counties to the Hannibal & St. Joseph Railroad, a few miles south of Linnæus.

**Chicago, St. Joseph & Santa Fe.**

A company with this title has been organized in Kansas, and its Engineer, Col. E. A. Whiting, has commenced a preliminary survey of the part of the proposed line from St. Joseph, Mo., southwest to Manhattan, Kansas, about 100 miles.

**Brunswick & Albany.**

The car works at Dawson, Ga., have recently completed 80 freight cars for this road.

**Brunswick & Vicksburg.**

This railroad, which will form the western extension of the Brunswick & Albany, is in operation from Eufaula, Ala., its eastern terminus, nearly to Clayton, 20 miles west.

German Railroads.

A railroad from Schweinfurt northwest about twelve miles to the fashionable bathing place of Kissengen, in Northern Bavaria, was opened August 15.

A section of the Paris & Hamburg Railroad from Munster, in Westphalia, northeast about 40 miles to Osnabruck, in Hanover, was opened September 1.

On the same day a short road in the Hartz Mountains, from Seesen northward to Osterode (Brunswick), was opened.

Prussia has granted a charter for a railroad in Holstein, from Neumuenster, a station on the railroad between Hamburg and Kiel, and about 40 miles north of the former place, eastward through Heide to Tœnning, a port on the North Sea, at the mouth of the Eider, a distance of about 50 miles.

An extension of the mountain line now extending from Verona into the Tyrol to Botzen is about to be made 20 miles further northward to Meran. It will have three tunnels, two viaducts and nine iron bridges.

Wellington, Grey & Bruce.

This Canadian railroad, which is operated by the Great Western Company, is now completed to the village of Harriston, within a few miles of the southern border of the County of Bruce, 16 miles northwest of the late terminus at Huston, and 44 miles from its southeastern terminus at Guelph.

Hartford & New Haven.

This company has about completed an enlargement of its tunnel in the city of Hartford, which having, to be made under the busy streets and without interruption to the traffic of the railroad, was a work of great difficulty and delicacy.

Connecticut River Railroad.

This road, says the Springfield *Republican*, "will probably be double-tracked, next year, from Chicopee to Northampton. Preliminary surveys are now going on under the direction of the officers of this road, for a railroad having one terminus at or near South Deerfield, and the other at or near Shelburne Falls."

Buffalo, New York & Philadelphia.

B. D. & F. W. Harris, of Brattleboro, Vt., have taken the contract for the construction of New York & Philadelphia Railroad, from Olean, N. Y., southward to the Pennsylvania State line, about eight miles. They are to complete the work by the 1st of June, 1872.

Pittsburgh & Connellsville.

This company has leased and is operating the Somerset Railroad, 9 miles long.

Rutland Railroad.

The holders of the preferred shares of the Rutland Railroad which were issued in exchange for the 1st mortgage bonds are requested to authorize the cancellations of the bonds, as four-fifths of the said bonds have been converted into preferred stock. This is in accordance with the agreement of August 18, 1867. A majority of the holders must consent to this cancellation before it can be made.

Harlem River & Port Chester.

The commissioners appointed to appraise the value of the land to be taken for this proposed road have awarded damages amounting to $30,000, estimating at the present value of the land, which has risen in consequence of the projected road. It is now intended to let the contract so soon as the appraisal of the commissioners has been approved, which will probably be at the November term of the New York Supreme Court. The company is authorized to construct a line from Harlem Bridge eastward nearly parallel with the line of the New York & New Haven, 20 miles to Port Chester, which is just outside of the Connecticut boundary. The President is Nathan A. Baldwin, of Milford, Conn., one of the directors of the New York & New Haven Company.

Pottsville Narrow Gauge.

The construction has been commenced of a narrow gauge line eight miles from Pottsville, Pa., through some suburban villages. It is intended chiefly for passenger traffic.

Denver & Rio Grande.

This railroad was completed to Colorado Springs, 76 miles nearly due south of Denver, on the 23d ult. It is the first three-foot gauge road of any considerable length in the country, and a careful record of its operations for a year or two will be valuable.

Pittsburgh & Castle Shannon.

This company proposes to construct a narrow gauge railroad from Pittsburgh southward, a short distance to coal fields, which promises abundant freight. M. D. Hays is President; Wm. H. Edgerton, Vice-President; E. W. Rolfe, Secretary and Treasurer, and Isaac J. MacKinley, Chief Engineer. The general offices are at No. 75 Fourth avenue, Pittsburgh.

Atlantic, Mississippi & Ohio.

This great Virginia Company have placed in the London market first mortgage 7 per cent. bonds to the amount of $6,000,000 (part of an issue of $15,000,000 authorized by the State) for the purpose of increasing equipment and improving bridges and permanent way on the old line, and completing the new "Virginia & Kentucky Railroad" 100 miles from Bristol, the western terminus of the old road, through Cumberland Gap. The old capital account of the road is light (about $35,000 per mile) and as $5,500,000 of the new loan is to take up old mortgages, the increase will make it about $50,000 per mile for the old road, or 40,000 including the new line which is to be built with proceeds of the bonds. A large part of the line is through a very fertile country, and the road ought to have a fine business. It has had since the war, from $3,000 to $4,000 per mile, but it needs many improvements to make it equal to a large business.

Baltimore & Potomac.

The track is now laid from the Patapsco River southward 21 miles and within 10¼ miles of Washington.

Knox & Lincoln.

This railroad is now completed from Bath northeast to Rockland, Me., and trains are running regularly.

Hudson & Superior.

The Bayfield (Lake Superior) *Press* says "a company of capitalists of New York city, with E. G. Roberts as President, has bought the old road bed on the line of the Hudson & Superior road, and will lay twenty miles of iron from Hudson to New Richmond this season."

Green Bay & Lake Pepin.

The Milwaukee *Wisconsin* says that a sufficient amount of iron has been purchased for the railroad to lay forty miles of track.

Brunswick & Albany.

A telegram from Atlanta, Ga., dated the 28th ult., says that parties are seizing the rolling stock and other property of this road, for debts. The iron for its extension, which had been landed at Brunswick, has been seized. No payments have been made for some time.

Western Maryland.

The directors, on the 24th inst., passed a resolution to the effect that by judicious efforts, the road can be completed to Williamsport.

Jacksonville, Northwestern & Southeastern.

This railroad, eighteen miles of which, from Jacksonville, Ill., southeast to Waverly, has been in operation a year, under the name of the "Illinois Farmers' Railroad," is now in progress southeast from Waverly, and is to be completed 15 miles, to Vinden, on the Chicago & Alton road, 21 miles southeast of Springfield, before the end of the year.

Burlington & Missouri River in Nebraska.

Western papers report the acceptance of bids for the grading a branch of this railroad from Crete, 20 miles southwest of Lincoln, at the crossing of the Big Blue, southward down that stream about 30 miles to Beatrice, near the southern border of the State. It is to be complete this season.

Missouri Pacific.

This company has recently constructed five very fine passenger coaches equipped with the Miller platform, and Westinghouse brakes, and exceedingly well adapted for the comfort and safety of passengers.

Connecticut Western.

A short section remains to be ironed after which the track of this road will be continuous from Millerton, N. Y., on the Harlem road, to Hartford.

Antietam Railroad.

Books have been opened for subscriptions to the stock of this company, which is to construct a line from the Antietam iron works, on the Potomac, at Sheperdstown, Md., northward through Washington County to the Pennsylvania line.

Northwestern North Carolina.

It is reported that a contract has been made with the Richmond & Danville Company by which the above road will be completed from Greensboro, N. C. (the southwestern terminus of the Richmond and Danville) west to Winston, Forsyth County, about 30 miles, by next July.

Maine Central.

The Portland extension of this road was completed to a junction with the Grand Trunk, October 6.

Prince Edward Railroad.

Grading for the narrow gauge railroad across Prince Edward Island was begun at Charlottetown October 5.

St. Croix & Penobscot.

This railroad, which extends from Calais, in the extreme southeast corner of Maine, inland 20 miles to Princeton, it is now proposed to extend northwestward to Grand Lake Stream, where the largest tannery in the world is to be built. A further extension of 24 miles would bring it to Passadumkeag and a connection with the European & North American Railroad and the rest of the world.

Alexandria & Fredericksburg.

This railroad, which the Richmond, Fredericksburg & Potomac Company is constructing, is now completed from the junction with that road to Quantico, on the Potomac, where trains connect with the Potomac steamers.

Ware River Railroad.

A Massachusetts paper reports that the extension of this railroad (Palmer, Mass., northward to Winchendon, about 40 miles) will be completed to Winchendon before Christmas, but that the extension will not be leased to the Newhamdon Northern as was first intended, and that an attempt will be made to break the lease of the part completed from Palmer to Ware.

Bucksport & Bangor.

The directors are authorized to issue bonds to the amount of $20,000 per mile. Samuel B. Swazey, of Bucksport, Me., is President.

Wilmington, Columbia & Augusta.

An extension of this railroad from Sumterville west to Columbia, S. C., has been completed, giving it an independent connection with Columbia.

Martinsburg & Potomac.

Major Edward Watts, the Chief Engineer, reports the probable cost of constructing this road from Powell's Bend, on the Potomac, southwest to Martinsburg, Va., 10¼ miles, at $285,000, and from Martinsburg toward Winchester, 13¾ miles, to the Frederick county line, at $351,000. It is intended to connect with the Pennsylvania Railroad on the north.

Indianapolis, Cincinnati & Lafayette.

It is reported that the litigation heretofore pending between the Indianapolis, Cincinnati & Lafayette Railroad Company and Mr. H. C. Lord, its late President, has been amicably settled, and that the contesting creditors have agreed to come into the arrangement of reorganization. All of the rest of the unsecured debt had previously signed the agreement.

Connecticut Valley.

This company is erecting an immense freight station on the new wharf at Saybrook Point. The passage station is also on the wharf, and passengers will step, as it were, from the cars to the boat and from the boat to the cars without the intervention of hackmen or of street cars. The new wharf now about completed at Saybrook is 500 feet long, and the depth of water is sufficient for all demands. During the winter the New York and Hartford steamers will run in connection with this road.

Chicago & Southwestern.

The Chillicothe (Mo.) *Constitution* says this company has determined to iron the road-bed from Taunton, on their line, south 20 miles to Chillicothe, on the Hannibal & St. Joseph road. The grading was done two years ago and transferred to the Chicago & Southwestern, together with that from Trenton to Princeton, over which the main line runs.

St. Louis & Memphis.

The Black River (Ark.) *News* says it is the intention of the St. Louis & Memphis Company to put a corps of engineers in the field to make a survey of the line this fall. The proposed route will start off from the Arkansas Branch of the Iron Mountain Railroad, at Poplar Bluff, and move through the counties of Butler, Dunklin, Pemiscot, Mo., and Mississippi and Crittenden, in Arkansas, passing through or near Chalk Bluff, Kennett, Osceola and Marion. This will be nearly an air line, only 110 miles in length, but there are boundless and almost bottomless swamps on the route.

Ottawa Junction.

This is the name of a company which proposes to construct a railroad in Canada, from a junction with the Grand Trunk at mouth of Rouge River, 33 miles west of Montreal, nearly due west, south of Ottawa River, to Ottawa, 80 miles, there to connect with the Canada Central. The engineer estimates the cost of construction (4ft. 8½in. gauge) at $12,000 per mile, and of rolling stock at $4,000 per mile. Municipal aid is expected to give it a start.

Cincinnati & Rockport.

The Cincinnati *Gazette* says that this company has closed a contract with Branham & Copley, of Madison, Ind., for the construction of its road.

Whitewater Valley.

H. C. Lord has brought suit against this company to recover $16,425 for services as President and General Manager of that road from June 9, 1865, to December 1, 1870. He also asks for $5,000 additional for special and extra service in the construction of the road and the sale of its securities.

Indianapolis, Bloomington & Western.

Six new locomotives, twelve passenger cars, and fifteen freight cars have been added to the equipment of this road, and an additional passenger train has been put on.

North Missouri.

Prominent citizens of St. Louis are endeavoring to have the suit of that city against this company withdrawn, lest it delay the equipment of the road and transportation of the large amounts of produce which are expected to reach St. Louis from the vast district through which its lines run.

Cairo & St. Louis.

The contractors are at work on this line, which is to be of three feet gauge.

Plymouth, Kankakee & Pacific.

Writing from Hennepin, Ill., on the 5th ult., Mr. T. J. Nicholl, the Engineer, says: "Piles are being delivered, and everything is ready to begin driving on the 10th. Track-laying will also begin about the same date at Plymouth, where 1,200 tons of iron have been delivered. We shall finish grading in Putnam County by November 1.

Chicago & Northwestern.

The grading of the Menominee Extension being nearly completed, it has been determined to survey a route for an extension from Menominee to Escanaba, thus completing a connection between the Wisconsin Division and the Peninsula Division. Mr. I. S. Dunning, one of the engineers engaged on the Menominee Extension, has charge of the survey, and lately commenced with a party at Escanaba, working southward. If the weather permits, this survey will be made this season, so that there may be no obstacle to the work of construction as soon as spring opens.

Dubuque, Bellevue & Mississippi.

The first 35 miles of this railroad is nearly ready for the iron, with exception of two bridges, one over Catfish Creek just below Dubuque, which will be a Howe truss of two spans, one 149 and the other 151 feet, which are well under way, and the other at Gordon's Ferry, opposite Galena, where it is determined to establish a station.

Boston & Albany.

The Springfield *Republican* says: "The Railroad Commissioners of this State have for some time been urging upon the railroads the importance of themselves conducting the express business over the different lines, and the directors of the Boston & Albany Railroad have decided to make the experiment in a small way. As soon as the necessary arrangements can be made they will establish an express between Boston and Worcester and intermediate points on the line, not to interfere with the transmission of money and the collection business, but only to transport heavy freight and merchandise packages, which are now conveyed by private express companies. That this is the beginning of an important change in the express business, we have no doubt, and that the change will be much to the advantage of the railroad companies and the satisfaction of the public, is equally certain."

Missouri Pacific.

Cars run through on this road from St. Louis to Fort Scott, Kansas City, Leavenworth and Atchison.